

Dennis Zongker talks you through the steps for bending wood for curved furniture

Bending hardwood for a table apron



PHOTOGRAPHS BY DENNIS ZONGKER

Furniture makers have used wood bending techniques for centuries producing astonishing curves and twists for furniture legs, edges and aprons. Having the ability to bend wood will open your mind to unlimited possibilities creating anything you can imagine. Gluing layers of hardwood together is called lamination, which, if done properly, can make an apron, leg or edge very strong leading to your project becoming a true, long lasting, heirloom quality piece of furniture.

For cold bending hardwood you re-saw your stock into thin strips and plane it so the thickness is even across the laminates. The thickness of the strips depends on the radius of the curve. The tighter the radius, the thinner the strips. The other factor to also keep in mind is the amount of spring back you can tolerate after the glue-up. This is the term used to describe the amount of deviation from the original shape of the formers when the glued-up section has been removed. If this amount can be reliably predicted, usually by experiment, this can be factored into the shape of your former. For these two aprons there was very little spring back on the smaller radius and the larger one had none at all. This has a lot to do with how many layers were used and the larger radius. For this dining table the aprons are long and wide so they need to be very strong and accurate.

Making the jigs



Cutting the radius with a small circle



Routing out the large radius clamping jig



Building up layers of plywood to make the clamping jigs

First you need to make two master templates that will be used to make a sandwich former to join the apron layers together. These table aprons are 32mm thick and 75mm wide. The radius of the sides and ends were different so I required two complete sandwich formers. To get accurate templates, screw the plywood to your bench or sacrificial board first. Then with a 1/2in diameter straight cutting router bit rout through the plywood into your sacrificial board with the convex radius first, then the concave cut, making sure they are exactly 32mm apart from each other. This is where the layers of hardwood will be glued together to equal a full apron.

The next step is to build up the height of each former to around 10mm more than the actual size of the finished aprons. Scrap MDF or plywood is usually adequate for this. Transfer the radius by placing the master template on the top of the scrap pieces and follow the radius edge with a pencil. Cut off the waste material approximately 3mm away from the pencil line, then from the bottom up build up the thickness by adding one piece at a time. Glue and pin each layer in turn, then rout off the excess with a flush trimming router bit with a bottom bearing 1/2in diameter router bit. Repeat this step until all four formers are completed. You'll have two sets of male/female clamps.

Making the aprons

I used genuine mahogany (*Swietenia macrophylla*) for the aprons because it is a strong, lightweight hardwood with a small to medium grain, which is good for gluing veneer over the face. To re-saw this hardwood, first cut the 85mm width then re-saw the thickness to 5mm. If your tablesaw doesn't have the capacity for deep re-sawing a well set-up bandsaw is a good alternative. Before I make the next re-saw cut I use a jointer to flatten the cutting face and remove the saw marks. For each apron, cut a total of 10 pieces, for an overall total of 40 pieces. The lengths of the long side apron on this project are 1370mm and the shorter end is 660mm long.

After running both faces of each layer through the thickness planer to equal 3mm thickness, screw the concave side of the former down to the bench. Then add three small cleats to the top of the jig with one screw on one end so you can rotate them to hold down the layers of hardwood while you are clamping the cauls together. It's always a good idea to first dry fit the 10 layers of the apron to make sure everything is working. Use a clean dry rag to wipe off any dust, it's also a good idea to remove any dust particles trapped in the pores. Use yellow glue such as Titebond and a roller to apply glue to all the faces except the two faces that will be against the jigs.



Rolling yellow glue onto the layers of hardwood



Clamping the layers of the apron together with the clamping jig

To clamp the layers together in between the two formers, screw down two blocks of wood right next to the concave former to help hold the apron in place while slowly tightening two or more bar clamps across both formers. Then rotate the three small cleats on top of the concave former over the top of the layers of the apron. Keep tightening the bar clamps until the layers are pressed together and you have applied as much pressure as you can to the bar clamps. Next, remove the three small cleats and wipe away any excess glue that has eased out of the layers. Let the glue completely cure before removing from the clamping jig.

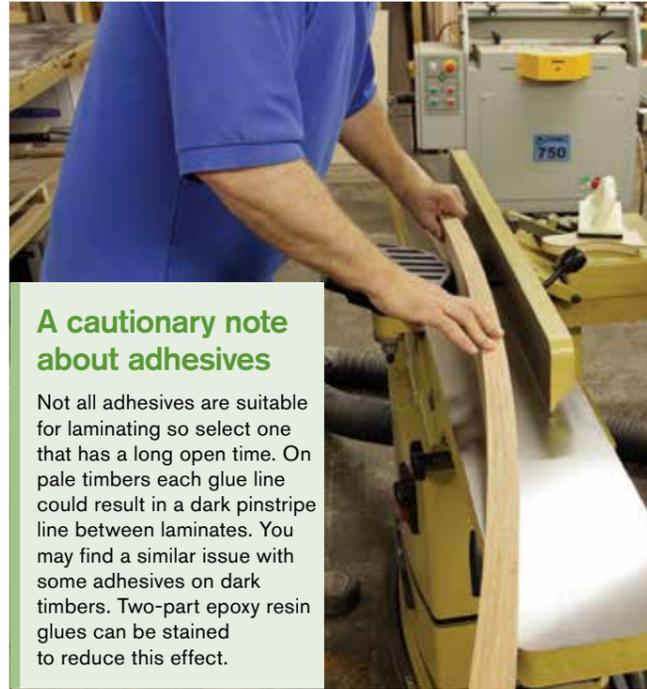


Close-up of the 3mm layers clamped between the formers. The broken pencil line shows a slight but acceptable deviation in alignment of the strips

Cleaning up

To clean up and flatten the top and bottom edges of the aprons, use a jointer to trim off approximately 0.75mm at a time until the apron's width is slightly wider than 75mm. To make sure the aprons are square and flat cut a template of 3mm or 10mm bending plywood right at

75mm wide. Then clamp it to the apron's inside face and also clamp the apron to your bench. Use a smoothing or block plane to level the apron flush with the template on both edges. This will ensure that the aprons are square and true without any twist.



A cautionary note about adhesives

Not all adhesives are suitable for laminating so select one that has a long open time. On pale timbers each glue line could result in a dark pinstripe line between laminates. You may find a similar issue with some adhesives on dark timbers. Two-part epoxy resin glues can be stained to reduce this effect.

Jointing both edges of the aprons



Hand plane the aprons square and flush to the template

Joining the curved parts...

To joint the curved aprons to the straight angled sections, I start by projecting the mitre lines from a full scale drawing with a square and pencil. Use a mitre saw to cut the mitres into the ends of the curved aprons. To set up for the cut, use two large shims on the back side of the radius to where the shims match up to the mitre fence and the radius apron. Line up the saw blade to your pencil line and adjust the apron for the perfect cut, then press the apron firmly to the fence and shims before making the cut.

For jointing the aprons together, I used dovetail splines. First, by using the convex former, cut off one end to where the end of the radius apron will sit at a 90° angle to the former. Screw the former to the bench then screw a straight edge block to the edge of the former to where the router bit will be centred to the end of the radius apron. This block is used for the router base edge to follow while routing in the dovetail dado. Then clamp the apron to the former and rout in the dovetail dado following the straight edge at a slow and steady pace.



Layout the mitres



Cut the mitres with a mitre saw



Routing in the dovetail dado into the radius aprons

Joining the straight sections...

For routing in the dado into the straight aprons make an angled jig that works the same way with a straight edge block screwed into the edge of the jig that the router follows. To make the dovetail spline, first cut on the table saw a piece of hardwood the thickness of the dovetail router bit (which is a 1/2in for the bit that I used for this joint) times the length total of both cuts into the ends of the aprons (which is 25mm) making the spline 1220mm long.

This is plenty of length to get all eight splines. Next, use a table router and set the height of the router bit to split the spline in half at 12mm. Then set the fence to where the wide part of the dovetail section of the spline is flush to the bit and doesn't trim off any wood. Finally, run all four sides of the spline through the router bit. After all the dovetail splines are fitted into the aprons, you need to make sure the table is square. Make four cross supports to connect the

whole apron system together for strength and support the top. These can be fastened in place with Dominoes, dowels or, as I prefer, with traditional half lap joints. There are restrictions in some areas on the use of dado cutters mounted on tablesaws, but they can easily be cut using a router or by hand instead. Set the dado blade height to 38mm, which is equal to half the width. Take a few passes to equal 32mm thickness of the cross support and to all four corners.



Marking the cross support aprons for cutting lap joints



Routing the dovetail dado into the ends of the straight aprons



Making the dovetail spline

Conclusion

When learning to bend wood it can take you into a whole new direction whether it is for a table apron like this or any piece of furniture that has curves or twists. When a board is re-sawn and glued back in sequence, the end result is that it looks like the solid wood it came from. It's possible that the components you create could have been shaped from a single board and perhaps this would result in less material being wasted. However, laminating will always result in a stronger and more stable construction. *F&C*



Table aprons and supports



The finished apron