Turning unusual-shaped pieces

Frederick Hill explores a technique for holding irregular work that leaves no marks on the underside when turned

PHOTOGRAPHS BY FREDERICK HILL

The normal way to turn a bowl is to create some kind of point on the back of the piece for attachment on a faceplate, jawed chuck etc., or to fix it between centres. I've been turning some of the fabulous Australian burrs – burls in the US – that have unusual and very interesting bumps and spikes on the outside. I didn't want to destroy those features so I have devised a method to attach the piece to the lathe securely in such a way that doesn't disturb or damage them.

Quite simply, this is done with a foam board cradle holding the piece on the lathe. The advantages of this method are many. In particular it lets me turn most unusual shapes without affecting the outside of the piece. I have turned a variety of burrs and other unusual shapes using this method. I'll explain in this article my method using a Eucalyptus vasticola burr.

The back of the above turned burr

Preparing the burr blank

When I buy my burrs they come in shrinkwrap so I leave that on in order to protect the surface. If yours doesn't have this, get some of the stretchy shrink/cling wrap and completely wrap the piece so none of the wood is exposed.

You now need to find the centre of the depression you intend to turn. Normally, at this point, you are interested in the bottom side of a piece as you will ultimately turn a foot for attachment to a jawed chuck. However, with my method you need to locate the spot you wish to turn on the top of the piece and forget about the back.

An easy way to find a centre on a piece is to use a pair of callipers. Open the callipers to the approximate radius of the depression you wish to turn and then, by trial and error, rotate it on the piece until you find the centre. Mark this point with a pencil so it stands out well. This will become the exact centre of the depression you are going to turn.

You will also need to figure out how deep to turn the depression in the piece – this isn't easy since the spikes on the outside create a false outside depth. If you aren't careful you can easily turn through the bottom of a shallow section and create a small hole at the base of one of the spikes.

There are many ways in which to determine how deep to turn these burrs and I'll explain my method. Examine the back side of the burr and estimate how tall the spikes are, especially in the area where you are going to turn the depression for the bowl. Add to that figure the thickness of solid wood you will leave in the bottom of the vessel when you are done turning the piece, plus a bit of wiggle room. Most of the time the Australian burrs I turn require that my total for this measurement be about 26mm – 13mm for the spikes, 10mm for the bottom thickness and I then add 3mm for adjustment of the bottom depth.

Go to your drill press, with a bit about 10mm-diameter already in place, and a piece of scrap wood that is the thickness of the measurement you determined, 26mm for this example. This hole will be used to align the burr when you bring up the revolving tailstock centre, so the hole needs to be big enough to accommodate your revolving nosepiece. Bring the drill down to the piece and set the depth stop of the drill for this measurement. I call this the positioning/depth hole, since it will serve as both a positioning and depth hole to allow you to accurately place the burr on the faceplate and determine how deep to turn it.

When you are comfortable that your drill bit is set accurately, drill a hole exactly on the centre mark you made previously and drill to the stop on your drill press.

Finding the centre

Setting the drill to depth

Drilling the Positioning/Depth hole

Creating a cradle

You are now going to need a piece of 20mm-thick plywood that is of adequate size to hold your piece. The plywood needs to be about 50-75mm bigger on all sides than the piece you are turning. Example: for a 250 x 200mm burr the plywood needs to be at least 355mm x 300mm. Centre the burr on the board as well as you can, as you are now going to start the process of attaching the burr to the board and need to know that the burr is centred as well as possible on the board.

Measure the height of the burr at this time and, using this measurement, cut four strips of 20 or 25mm softwood, not plywood, to that measurement. You will use this wood to create a batten dam/wall around the piece, so the pieces need to be the height measurement wide and a bit shorter than the diameter of the piece you are turning. Centre the burr on the board and place the dams on all four sides. Cut them to length at this time. Glue them in place once you have figured out where they need to go. I use a bead of yellow glue on the bottom of the battens and then, after putting it in place, rub it back and forth in order to spread the glue. The four wall sides need to be about 13mm away from the burr. Put the board and burr aside for about an hour for the glue to set.

Once set, flip the board over and, carefully, find the position of the batten dam sections and run a drywall screw into each end of each of the four pieces. Let this set overnight to be sure that the glue is dry and has its maximum holding power.

You now need to flip the board over on to its back with the dams up. Put a cheap plastic bag or a double sheet of thin plastic film on the board and over the dams and then place the plastic wrap-covered burr on that. Normally I use a disposable plastic shopping bag for this.

At this time, I make a reference mark on the edge of the burr and its associated wall/dam so I can replace the piece on the board easily when I have to remove it later.

Measuring the height of the burr

Cut two approximately 13mm thick strips that are about 20mm wide and long enough to span between two parts of the dam and just catch the edge of the burr. You will screw these pieces in place to hold the burr against the board. I use drywall screws for this and pre-drill the holes in the strips. These two pieces will serve as cross braces to assure that the burr doesn't come out of the foam board holder.

The battens glued in place to create the dam/wall around the work

The blank and batten walls are marked with location mark, the inner section of the dam is lined with polythene sheeting and the wrapped burr is nestled in place

Positioning and support

I am now at the point of making the foam board cradle that will hold the piece in place on the lathe. I use a foam insulation called Great Stuff, which comes in a variety of types. I use the triple-expanding, Gaps & Cracks type for my projects. There are other brands of foam insulation that you can use. Just be sure to use the type that dries hard (there is one that dries to the consistency of shaving cream that you should avoid). Be sure to shake the can before use as indicated in the instructions. This insulation is one of the best glues out there (for fingers and clothes, anyway), so heed the advice on the can about wearing appropriate protective equipment and old clothes when you are using it. To clear the uncured foam from the nozzle and tube of the can and tools, etc., soak them in acetone immediately before the foam dries.

Poke the tip of the expanding foam tube under the burr, between the plastic bag on the board and the plastic wrap on the burr, and add a bit. Move to another spot and repeat. Watch to see that the foam is filling up the cavities under the piece and continue adding slowly until you are certain you have formed a foam cradle for your piece. The cross braces will hold the burr against the board so the foam doesn't lift it when it dries. Again, put the piece aside for at least 24 hours before proceeding to the next step.

Squirting the expanding foam under and around the burr

Fixing battens across the burr into the wall to secure the burr in place while the foam sets to the right shape

Mounting on the lathe

You can now mount the board to the lathe. I use a 150mm faceplate for this. Place the faceplate by itself – no board attached to the inboard headstock spindle. This next part is a bit awkward so you may need help to do it properly. Place a pointed-end revolving tailstock centre in the tailstock end of the lathe. Lift the board and burr and centre it against the large faceplate, then bring up the tailstock with the revolving nosepiece. Lock the tailstock in place, push the tailstock revolving nosepiece into the Positioning/Depth hole and tighten the pressure in order to hold the foam board on to the faceplate by friction alone. Shift the board to be sure it is resting squarely to centre it against the work. Using a pencil, trace a line around the perimeter of the faceplate to fix the location of the faceplate on the board.

Take the board off the lathe, turn it upside down and place the faceplate inside the circle you just drew on the board. I use a hinge centre punch to delineate the location of the centre of each faceplate screw hole and then attach the faceplate to the board with suitable screws. Use as many screws as your faceplate will accommodate. I like to use the flat-head wood screws with the cone-shaped head so that the screw head helps hold the position of the faceplate.

Place the large faceplate and attached board/burr to the lathe and carefully tighten it. If your faceplate has a set screw, tighten that at this time also. Most of these burrs will be out of balance. I once turned one that was nearly 600mm long by about 300mm wide. It was way out of balance. If you try to turn these without them being balanced, you will be severely limited as to the speed at which you can turn the item. I now balance the board/burr using lead diving weights to counterbalance the weight of the board. First find the heavy end of the turning by allowing the piece to turn to its resting position. Mark the board at the 12 o'clock position. Recheck to assure that this is accurate

by free-spinning (lathe turned off) the piece and seeing where it comes to rest. Now, guess how much weight needs to be added at the 12 o'clock position to balance the piece. I have lead diving weights in a number of sizes that I use for this purpose. The weight needs to be attached firmly to the board using screws. I've balanced turnings that have required as much as 1.8kg of counterbalance weights. The one in this article only needed 226g of weight to balance it . For larger weights I screw the weight to the board with multiple screws and then check to see if that is enough weight. When you attach the lead be absolutely certain that you use enough screws to hold it in place. If you are using lead diving weights you can easily cut them with a woodcutting blade on a bandsaw to get the size that you need.

Align the hole of the burr against the revolving tailstock centre

Once centred against the faceplate, draw around the faceplate

Counter balance fitted on the base support board

Turning

In order to be on the safe side I like to bring up the revolving nosepiece on the outboard end in order to secure the work and holder to the lathe while doing the initial turning. I leave this in place until it is in the way of my turning the piece. Before you start your lathe, make sure everything is secure and rotate the work by hand to ensure that the holder and work does not foul anything. Cut off corners of the board if they hit the ways of your lathe. When you start your lathe, double check before hitting start to be sure that you have the lathe speed at its lowest setting. Always do this with every item you turn so you don't accidentally start the lathe when it is in a high-speed setting (hopefully the reason for this should be obvious). Also, never stand in the line of fire of the revolving piece. No matter how much care you take in securing your piece to the lathe, something could go wrong and you could have a 2.5kg (or more) missile flying through the air at you. You also need to keep clear of any extended edges of the support boards or battens.

Carefully turn the depression you want on the piece using the drilled hole as your depth guide. Generally, the Australian burrs have a slight colour change that can be seen as you get near the outside of the piece. Err on the side of caution when you turn your burr – you don't want to make this expensive piece into an accidental lampshade.

If you want to check your progress, the foam board is perfect for this as it allows you to remove the piece and put it back after checking. Simply remove the two cross braces and pry the piece out of the foam. You can now measure the thickness and determine if there is anything else you need to do on the piece before putting it back in place. Be sure that you have marked a spot on the burr and its corresponding dam in order to get the piece back in place easily. When you put the burr back be sure to tighten the cross braces to hold it in place.

Once you are certain that you have turned the burr to your satisfaction, sand it. First remove the cross braces and sand the face of the burr. You will need to bring up the tailstock to hold the burr in place during this procedure. To protect the turned area from tool marks I put a thick pad of rag or similar item on the end of the revolving centre and use this to push the burr into place. Now put the cross braces back in place and sand the hollowed-out centre you turned. You can sand the entire burr either with the lathe running at a slow speed or stopped.

Turning the inside without revolving tailstock centre support

Supported inside while ready to deal with the top of the bowl

Finishing touches

Remove the burr from the holder and inspect it carefully. If it is ready for finish, do so at this time. If you wish to turn another part of the burl you need to drill a new Positioning and Depth hole in the appropriate spot and then repeat from Mounting On the Lathe above onward. This is an easy process because you can easily reposition the faceplate on the back of the board in order to do this. Simply drill the new positioning/depth hole on the front of the burr and use it to position the faceplate on the back.

Remove the burr from its holder and brush off any dust, etc. If you are happy with the end result you can now spray-finish the back of the burr. Sometimes the burr won't sit on a table in a position that I want, so I flatten a small part on the back to give it a resting place on a drum or belt sander, taking off only a small piece of wood at a time. Alternatively, you can create an inserted leg-type arrangement to level things off.

This technique also lends itself to holding pieces that you are going to carve with power carvers. The potential uses for this method are many. Enjoy.