PHOTOGRAPHS BY KURT HERTZOG

How am I going to do that?

Kurt Hertzog completes his series on woodturning know-how by bringing together all the techniques to make a ceremonial teacup and tray

Someday, someone will solicit you to make what they profess to be a simple turning as a creation or a repair part. Always said to be quick and easy by the non-turner, but not always so. You'll get a sketch at best or perhaps just arm waving. I'd like to finish this series with a project such as this using many of the various techniques we've covered over the past issues. It's a bit of a contrived example perhaps, but hopefully you'll find it a helpful exercise. We'll roll in process planning, materials selection, workholding, measuring, patterns, turning for assembly and more. The example I'll use is a ceremonial teacup and tray that will be used in a special celebration.

I was asked to do the turning and rough sanding in preparation for the Japanese lacquering, which would be done by the originator of this project.

The drawing I was given was said to be full size with no scale and no tolerances. It was front and back on a single sheet that you needed to see through. The lacquering to follow my work allowed me wide latitude in terms of choice of materials since my part really was only a substrate. Needing only to be relatively inert, i.e. dry, and with the material selection and grain orientation providing sufficient strength, I had a lot of freedom. Let's follow the thought and execution of this project through from start to finish.

KURT HERTZOG

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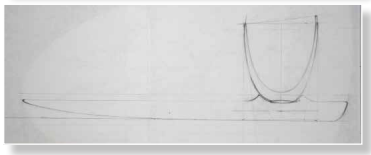
THINK FIRST, CUT SECOND

My best advice to all who will listen is to think for a bit before you cut anything. Much like the common saying 'measure twice, cut once', you'll save far more time by planning your process, material and workholding upfront than you will use doing it. As I reviewed the drawing, I could see a cup and a tray irregularly shaped with a nest for the cup. Because the tray was irregular shaped and the nest was in a non-symmetrical position, there was no real sense in turning the tray. If it needed to be homogenous, you'd be forced to turn the tray with the nest at the centre and then cut away the unwanted material. Alternatively, you could do an offcentre turning along with some trimming. Either method would maintain a grain match in the tray. Because of the subsequent jet-black lacquering, I was free to use multiple materials and pieces so I decided to make this as three different pieces. The tray was one piece that could be cut on the bandsaw and sanded as needed. The nest could be turned and added to the tray and feathered in at the material join. The third piece was to be an end grain hollowing that would create the cup.

While the decoration on the top for the planned painting on the black lacquering isn't necessary, the drawing as presented is all there is to work with



The back side of the sheet shows the other view of the tray profile and the cup design. With nothing absolutely critical, getting the final result close to the picture is the goal

THE TRAY

Without getting too crazy, I measured the drawing to determine what the size of my raw materials needed to be. My tray material needed to be 350 × 225 × 19mm to be able to cut out the irregular shape as drawn. Photocopying the pattern, I created several templates that I could write on, fold, cut up or generally abuse without putting the original in jeopardy. Because my photocopier doesn't have darkness controls or enlarging, I was forced to copy as best I could and cut and paste things together to suit my needs.

Since I was working under the gun on this job, I needed to find what I had in the shop that would work, whether it was ideal or not. Sometimes it's better to use more expensive materials and save the time you would have needed to spend sourcing more cost-effective materials. A trip through the shop only yielded some padauk (*Pterocarpus dalbergioides*) that was the right thickness and was right on the very edge of fitting my needs. As the piece was going to be black lacquered over, I really didn't need to use padauk, but that's what I had so I went with it. It was exactly the right thickness, saving the time and mess of any thickness sanding. In a perfect world, you might get some cheaper stock and perhaps glue-up boards if needed, but time drove the selection on this one.

The pattern was taped together and then taped to the top of the selected board. It was bandsawed to the rough shape and then subsequent sanding at the belt sander got the shape pretty close to what I was looking for. While flat, the centre of the nest was located and a Forstner drilling was done to act as a receiving well for the subsequent gluing of the cup nest. The tapering of the thickness profile would be accomplished at the belt sander at the end.

Numbers are rarely needed in woodturning. The tape measure is only used for convenience to search through the shop for raw materials that are the right size for the task

Because of the limitations of my copier, I need to make copies in halves and tape them together. Checking for dimensional integrity, the tape-ups are fastened to the stock for cutting

THE TRAY (CONT.)

Using a photocopy of the master pattern, the tray blank is cut from the padauk material on the bandsaw. Minor stock is left proud of the pattern to refine the actual edge at the belt sander

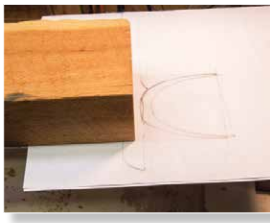
Using photocopies of the 'master' drawing, the pattern is fastened to the tray material and the shape is cut on the bandsaw. It's important to mark the centre point of the cup nest prior to removing the pattern

THE CUP

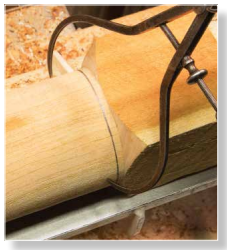
The cup size and shape required a bit of thought. The top of the cup is cut at an angle that I measured as just shy of 10°. To accomplish that I could have turned a standard cup to the desired shape and tried to sand the angle in, but I thought that would be problematic for two reasons. First, the walls would be pretty thin so cutting or sanding those walls would be prone to damage. Second, and more importantly, by doing that last I would have had a big investment in time. Any failure at that point was really costly, so I thought setting up and cutting the angle and then hollowing the cup was the best bet. To be certain I got the best accuracy, I turned the outer diameter of the cherry (*Prunus serotina*) block selected for the cup to the largest indicated size. I also put the tenon on the blank for chuck clamping. By leaving the flats on the blank for stability in cutting afterwards, I could safely cut the 10° angle using a stop block and clamping the blank to the fence.

After the top rim angle of the teacup was cut, the cherry block was mounted in a chuck and the outer shape was turned and then sanded. Enough material was left at the base to maintain the strength needed for hollowing. With the inside hollowed using a hollowing bar and sanded, the bottom was shaped as much as possible prior to separation from the original blank. As mentioned previously in this series on workholding, it is good practice to use the tailstock whenever possible. When the hollowing was done, there was more to do on the outside and into the base. For safety and support, the tailstock and tailcentre were brought to bear. With the pin removed from the tailcentre, a tennis ball was used for additional support of the turning.

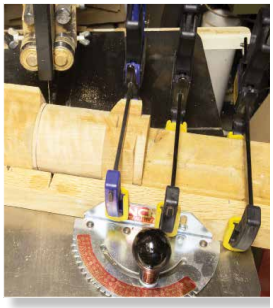
The angle of the cup lip is measured for planned processing as is the maximum cup diameter for selection of stock. Simple and effective measuring tools with no numbers really needed, just settings



Because there is no species match needed, a blank of cherry is selected for the cup. It will be an end grain hollowing to provide for minimal shape change and maximum durability across the lip cut



The blank is turned to near the maximum diameter and marked for the angle cut start position and absolute bottom of cup. Flats are left intentionally to allow for safe cutting on the bandsaw



With the tenon cut for the upcoming chuck mounting, a stop block is clamped in place as is the cup blank after the fence is set for the desired angle. The flats intentionally left make a 'V' block unnecessary

THE CUP (CONT.)

With as much of the cup done as possible, separating it from the base and reverse mounting allowed for the base to be completed. The only negative aspect of cutting the angle across the rim of the cup occurred now. The angle across the rim made using a jam chuck nearly impossible. Using my long vacuum chuck simply as a friction chuck, the tailcentre securely held the turning for nearly all of the work on the bottom. To complete the last scalloping in the bottom, the tailcentre was retracted after the vacuum was turned on. A light touch and sharp tools made short work of putting the slight dish contour in the bottom. The tailcentre was returned to provide additional security for the last cuts and sanding of the piece. The point was removed and some padding inserted on the nose to prevent damage to the bottom.

From a precision and safety aspect, it doesn't get any better. No hands needed to secure the stock as the cut is made and cutoff material is free to separate without restriction

Mounted in the chuck with daylight at the bottom, the tailcentre is used as good practice. The absolute bottom is marked as is a cut to the diameter at the bottom of the cup at the nest interface

With the simple shape of the cup, a template as shown in past articles really isn't necessary. A photocopy of the cup folded to fit will provide feedback on the size and the curve

Always use the tailcentre whenever possible, not only for safety but also for stability. With the point covered, a tennis ball provided compliance and fit

As covered in the workholding series, a friction drive can be made to suit nearly anything. Here, one of my vacuum chucks works nicely

The only disadvantage of cutting the angle across the lip of the cup early is the inability to use a jam chuck for reverse mounting. There are other methods though, including a vacuum chuck

THE NEST INSERT

By design, I had decided to create a pocket in the tray for a nest to be inserted. This solved several problems. First and foremost, it turned the tray into a simple piece of woodworking as there was no turning required at all. The second advantage was that the nest material, cut from a scrap from the tray cutting, could be turned and fit by trial and error to the base of the cup. By working the process in this sequence, there really was no critical measuring. The Forstner bit pocket was selected to be as large as possible. The nest was turned between centres to create a tenon that was the same size as the pocket in the tray. Fit wasn't critical. Once the tenon was a slip fit, the nest was reverse mounted using the tenon as the grip point in a chuck. The nest contour was easily created. The excavation of the depression in the nest was a simple trial-and-error process using the cup. When the fit was right, the nest was sanded and ready for gluing.

The reason for the pocket and the tenon design was to provide for location and also to make gluing an easy process. With the tenon on the bottom of the nest, the gluing simply involved dropping the nest into place and putting a weight on top. It was rotated for the best grain match for the sanding later on. Another benefit of creating the nest as an additive feature rather than a subtractive feature in the tray was error recovery. If the nest had been turned in the parent tray by whatever means, any mistake would have meant having to scrap the tray – a large loss of time spent and material used. By creating the nest as an added part, any mistake could be rectified with a simple remake of that part until satisfied – less material wasted and time lost.

Some wood glue on the underside of the nest rim and around the tenon was all that was needed here. Dropped into place and rotated to allow for a degree of some grain match, a weight was put on top and the assembly was left overnight to cure. With a form of about the same shape as the curve in the nest rim, sandpaper was wrapped around it and the small lip of the nest was sanded flush to the top surface of the tray.

The beauty of additive processes is the error recovery potential. The cup nest, trial-and-error fitted, can be made as many times as needed with minimal loss of time and material

The cup nest, trial fitted in the Forstner hole and cup bottom, is wetted with some wood glue and dropped into place. A weight on top holds it flush until cured

With only a small lip to be removed, sandpaper wrapped around a similar radius mandrel is used. The surface will be further prepped for lacquering

FINISHING UP

With everything completed, the tray was taken to the belt sander for the final contouring of the shape. The rounding of the edges and the tapering of the thickness was completed. This could have been done earlier in the process and doing it at the end did involve some risk should the sanding of the tapering thickness have gone awry. However, I chose to wait because working with the tray and the gluing was easier with things being flat. The entire tray was sanded with a coarse grit sandpaper since the lacquer artist will want to do any final shape alterations and sanding in preparation for the lacquering process.

"The entire tray was sanded with a coarse grit sandpaper..."

CONCLUSION

This project could have been done other ways, you might have done it differently. I chose to use it as an example of how I think through the process and how I chose what I thought was the simplest and most forgiving method. As we close out this series, I hope this pulls together many of the various aspects we've covered: planning ahead and solving the problems mentally before cutting anything; using an additive assembly process when it makes sense rather than the traditional subtractive process we are all used to; good practices in workholding, not only from a safety standpoint but also from a strength of materials; and working towards the point of drive and grip.

The pieces are now packed to leave in the morning for the lacquering. Hopefully, I'll be able to get additional photos of the final results after lacquering but in the interim, take a look and see if you think I've succeeded in providing the desired substrate in a reasonably efficient manner. Think twice, or more as needed, and then cut.

There are many ways to tackle this project but I think my way was straightforward and got to an acceptable end point