The Making of *Kilkea*

Multi-axis Turning

Brendan Stemp

The concept for *Kilkea* evolved from a design that was considerably different from the one featured in this article; its development is an example of how a technique can be the impetus for new creations. The starting point was a sketch I made in 2004 of a simple boat-shaped bowl. The shape was simple; however, the process to make it proved problematic. ▸

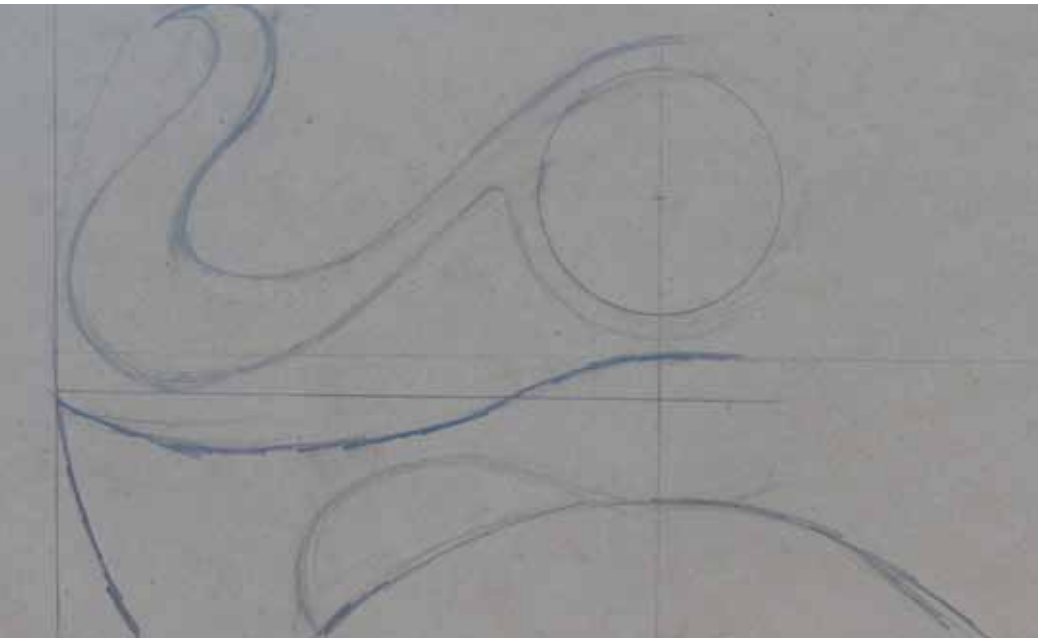


Figure A. The author's rough sketch for *Kilkea*.

As I worked through various problems, I produced many forms that I did not like, as well as some that had potential. As I refined the technique, I began to have more success, but more important, I started to see the design possibilities. *Kilkea* is a far cry from my early attempts, and is the result of much exploration.

The name *Kilkea* is taken from the hometown of Ernest Shackleton, an Anglo-Irish explorer. I have used references to Antarctic explorers before to name some of my other pieces; it is a connection to an interest of mine. Shackleton's story is well worth reading.

The process

Sound competency in tool techniques and knowledge of woodworking methods are required for this project—it is complex. Additionally, it will take quite a lot of time to complete. *Kilkea* took approximately thirty hours and is the largest piece I have made using this technique. I recommend that you first try this process on a smaller scale.

You will need wood glue (I used PVA, a form of yellow glue) and plenty of *scrap wood*—I used radiata pine, a timber I have in abundance and in large sections. The timber used to make the actual piece, *good wood*, was a 6" (15 cm) square of fiddleback red gum that was 18" (46 cm) long. (You might want to try a piece that is 2" [5 cm] square and 6" [15 cm] long.)

To begin, cut the good wood to length and dress two opposite sides using a jointer. Glue and clamp enough scrap wood to the sides of the good wood to create a diameter of 18" (46 cm) *(Photo 1)*. After the glue cures, you will cut a disc, but before cutting, carefully measure the width of the good wood to find its center *(Photo 2)*.

With the center carefully located, draw an 18"- (46 cm-) diameter circle *(Photo 3)* and cut the disc on the bandsaw *(Photo 4)*. Attach an 8"- (20 cm-) diameter faceplate to what will become the top surface of the final piece, making sure the disc is centered on the faceplate *(Photo 5)*. Use a large faceplate to bridge the good wood so that the screws will be screwed into the scrap wood.

1 The initial glue up consists of two sides of scrap wood with the good wood glued in between.

2 Carefully measure the good wood to find its center.

3 Draw an appropriate-sized circle.

4 Cut out a disc on the bandsaw.

5 Attach an 8" (20 cm) faceplate to what will become the top surface of the final piece. Make sure the faceplate is positioned in the center of the good wood. The large-diameter faceplate allows the screws to be placed in the scrap wood.

Figure B shows the four surfaces turned using this multi-axis technique on a different piece.

Turn the disc and the underneath

Kilkea has four turned surfaces: (1) the *top*, including the bowl, (2) the *underneath* curved void, (3) the *front*, and (4) the *back*. The top and underneath surfaces are turned on one axis and the front and back surfaces are shaped on a second axis.

Turning starts with work on the area that will be the underneath surface of the finished piece and the first step is to turn that surface flat.

Next, I turn a simple hollow shape (curved void). I took the depth and diameter measurements from a scaled drawing I made prior to starting the project. I made this bowl 9" (23 cm) wide and 2" (5 cm) deep.

Mark a line to indicate the diameter of the curved void *(Photo 6)* and hollow out the underside of the piece *(Photo 7)*. Keep an eye on the depth. After the desired amount of wood is removed, sand the interior of the hollowed-out area.

A flat base is required for the bottom of the wings of the final piece, so check the outer rim of the bowl using a long straightedge *(Photo 8)*.

Turn the top

Turning the top of the piece is next. So that you can reverse the disc and remount it onto the lathe, screw a piece of hardwood onto the bottom using the scrap wood of the disc as the attachment points *(Photo 9)*. The scrap hardwood should be at least ¾" (20 mm) thick and the same length as the diameter of the disc.

Attach a faceplate to the scrap wood board. The use of a reversing mandrel helps to ensure that the faceplate is centered on the disc *(Photo 10)*.

With the faceplate screwed into position, flip the piece around, screw the second faceplate onto the headstock, and start shaping the top surface *(Photo 11)*.

I start by turning the small bowl *(Photo 12)* and then shape the curve ▸

Draw a circle to indicate the diameter of the curved void in the underside of the turning.

Hollow out the curved void of the underside of the piece. Sand when finished with this section.

A flat base is needed for the bottom of the wings of the final piece, so check the outside surface with a straightedge.

Untitled, 2007, Huon pine, 6" × 6" × 10" (15 cm × 15 cm × 25 cm)

Screw a piece of hardwood onto the bottom using the scrap wood as the attachment points.

Attach a faceplate to the hardwood board. The use of a reversing mandrel helps to ensure that the faceplate is centered over the disc.

With the disc remounted on the headstock, begin turning the interior of the small bowl.

Untitled, 2005, Red gum, 4" × 5" × 7" (10 cm × 13 cm × 18 cm)

Shape the top surface and refine the opening of the small bowl.

Keep the curve of the top surface simple; subsequent steps will be easier. Sand all of the surfaces of this side, including the small bowl.

Cut a small step near the opening of the bowl to accommodate a lid. I use a sharp skew chisel as a scraper.

Take the disc off the lathe and cut away the scrap wood.

in the top *(Photo 13)*. This curve is kept minimal in order to make subsequent processes simpler. After turning, sand these surfaces, including the small bowl.

Cut a small step that will accommodate the lid. To cut this step I use a sharp skew chisel as a scraper *(Photo 14)*. By using a skew chisel in this manner, I am able to cut the step cleanly enough to avoid any sanding, which keeps the edges clean and crisp.

The turning is complete on the top and underside. Take the piece off the lathe and cut the scrap wood away from the good wood using a bandsaw *(Photo 15)*.

Make a carrier

The next stage of the process does not involve the good wood, so put it aside while you make a carrier. The carrier is another block of laminated scrap wood that the good wood gets glued to so that the good wood can be turned on a second axis. Glue together sufficient scrap wood to create another disc that measures 19" (48 cm) in diameter and about 3" to 4" (8 cm to 10 cm) thick *(Photo 16)*. Allow the glue to cure before cutting the block into a disc.

Mount the disc onto the lathe, using the faceplate *(Photo 17)*. Later in the process, the top surface of the good wood will be glued to the carrier and for this to be possible, a negative

Glue up more scrap wood to make a carrier. For *Kilkea's* carrier, I created a disc that measured 19" (48 cm) in diameter and about 3" to 4" thick (8 cm to 10 cm thick).

Allow the glue to cure, then cut out a disc on the bandsaw and mount the disc onto the lathe using a faceplate. This disc will be shaped as a carrier for additional turning of the good wood.

Measure the high and low points and the distance between them for transferring to the carrier.

of the top surface of the good wood needs to be shaped into the surface of the carrier.

When I first started making these pieces I thought that matching the carrier to the previously turned good wood would be a difficult process but there are some simple techniques that help make it reasonably straightforward. The first is to understand that the high points on the good wood will be low points on the carrier and vice versa. I start by measuring the length between the high and low points on my good wood *(Photo 18)*.

I also measure the distance from the center to the low point and transfer this information onto the carrier by drawing lines that indicate the low point. Lines are also drawn for the diameter of the bowl and the outside diameter *(Photo 19)*.

Shape the carrier using a bowl gouge and/or scraper. I do not concern myself with cutting cleanly; however, it is important to establish the low point on the carrier and the maximum diameter it needs to be *(Photo 20)*. Because the top curve of the good wood is kept simple, creating the negative of it on the carrier is not too difficult. Keep the good wood close by and as you get closer to the final shape, regularly stop the lathe and check the fit *(Photo 21)*.

The fit does not need to be perfect because an application of hot melt glue will act as gap filler.

Great Scott, 2008, Sassafras, 4" × 4" × 6" (10 cm × 10 cm × 15 cm)

With the carrier shaped, another piece of scrap wood is needed to fill the void on the underside. Shape this using the same technique ▸

Transfer the measurements to the carrier disc to indicate where the high and low points will be located.

Shape the carrier. I use a bowl gouge and scrapers and am not concerned with cutting the wood cleanly. Establish the depth of the low point on the carrier by measuring.

Keep the good wood nearby and as the final shaping progresses, stop the lathe regularly and check the fit.

Another piece of scrap wood is needed to fill the void on the underside. Shape this wood using the same technique as for the carrier.

I use hot melt glue to attach the good wood to the carrier. Apply the glue to the carrier across the area where the good wood will be attached.

Reheat the hot melt glue using a flame.

Attach the good wood to the carrier.

Attach the plug to the underside of the good wood, gluing in the same manner as for the carrier.

Cut the assembly on the bandsaw, following the outline of the good wood.

The assembly is now ready for the next stage, a glue-up for turning on a second axis.

Endurance, 2009,
Red gum, 4" × 6" × 6"
(10 cm × 15 cm × 15 cm)

(Photo 22). There is no need to sand the surface.

Attach the good wood to the carrier

To attach the good wood to the carrier, I use hot melt glue, which lets me separate the two after the turning is complete *(Photo 23)*. A problem I had with my early attempts was the good wood separating from the carrier while spinning on the lathe, so I had to find a means of making the hot glue stick better. I discovered that the hot melt glue was cooling too much before I could bring the two pieces together, compromising the adhesion. My solution was to apply the glue to the carrier using the glue gun, and then heat the glue using a flame *(Photo 24)*.

With the glue almost at the point of combustion I quickly position the good wood and apply pressure to the two surfaces *(Photo 25)*.

The plug to fill the underside void is attached in the same manner *(Photo 26)*.

Take the assembly to the bandsaw and remove the excess wood on the sides *(Photos 27, 28)*.

Build up wood for second disc

The carrier and good wood spin on a second axis so you need to build up the assembly with extra timber to create another disc (*Photo 29)*. The shape of the final piece can vary quite a lot depending on how close the good wood is positioned to the center of the new axis. I positioned the top surface of *Kilkea* close to the center of the axis, which made the sides close to parallel. In other pieces I have made the bottom close to the outside rim of the disc with the result being sides that curve more distinctly inward *(Figure B)*.

Mark a center making sure the center point is positioned in the scrap wood. Draw a circle *(Photo 30)* and

take the glue-up to the bandsaw and cut out a disc.

Turn the front surface

I use a screw chuck to mount the disc onto the lathe. The hole for the screw can be drilled accurately using a drill press. However, this disc was too wide for my drill press, so I used my hand drill for the job *(Photo 31)*. I do not drill the hole all the way through, preferring to drill the hole on the other side while the piece is on the lathe.

I have a faceplate that accepts the screw. Thread the disc onto the screw *(Photo 32)*. You are then ready to turn the front surface. Turning can commence; however, another problem is encountered. The disc is poorly balanced because of the difference in weights between the good wood (red gum) and the carrier (pine).

29 The carrier and good wood need to spin on a second axis, so it is necessary to build up the assembly with extra wood to create another disc.

30 Mark a center for cutting out a disc. Varying the location of the center will affect the outcome of the finished piece.

Vicmarc has a counterbalance accessory to help overcome the problem of out-of-balanced wood. By using the counterbalance accessory, I can spin the wood at a faster speed *(Photo 33)*. Without it, I would need to use a slower rpm.

I am now ready to start turning and shaping the front surface on the second axis. I refer to my drawing regularly while shaping the front, as I can no longer see the bowl because it is glued to the carrier *(Photo 34)*. ▸

31 Drill a hole for a screw chuck for mounting the disc onto the lathe.

32 Screw the faceplate and disc onto the lathe.

33 Because of the difference between the weight of the good wood and scrap wood, the disc may be unbalanced. My Vicmark lathe has a counterbalance that helps overcome the problem of unbalanced wood.

34 The disc is ready to begin shaping the front surface. The good wood will now be turned on a second axis.

35 As wood is removed, gaps may appear between the carrier and good wood. To prevent the edges from being chipped away, use hot melt glue to fill the gaps.

36 Finish shaping the front surface and then sand that area. Drill a hole in the center to take the screw chuck so that the piece can be reversed.

I pad my scroll chuck before reattaching the disc for turning the other side.

The disc is attached to the lathe and ready to turn the outside surface.

Shape the back surface. At this point, it is important to refer to the drawing to avoid making a cut that is too deep.

I usually drill holes in strategic positions through the scrap wood. Doing so helps determine the thickness of the wings.

Tangere Videre Est, Myrtle, 4" × 4" × 12" (10 cm × 10 cm × 30 cm)

As wood is removed, gaps appear between the carrier and the good wood and these gaps can result in the edges of the top surface being chipped away. I use hot melt glue to fill the gaps *(Photo 35)*.

Finish shaping the front surface and then drill a hole in the center to take the screw chuck so the piece can be reversed *(Photo 36)*.

Shape the back surface

I now use the screw in a four-jaw scroll chuck, which I pad to avoid any marks being made on the good wood *(Photos 37, 38)*.

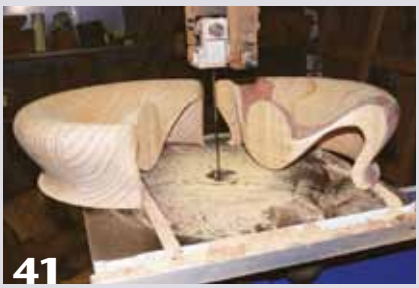
Start shaping the back surface *(Photo 39)*. At this point it is extremely important to refer to the drawing to avoid taking any cut too far.

I drill holes in strategic positions through the scrap wood. These holes help me see what the thickness of the wings will be *(Photo 40)*.

With holes for the screw chuck in both sides of the form, you can reverse the piece at any time and work on either side. When you are happy with the shape, sand both sides. The turned piece is now ready to be taken off the lathe and the good wood separated from the carrier.

Separate the good wood

To separate the piece from the carrier, I normally put the form in a



After the turning is finished, cut the good wood away from the scrap wood.

Use a hot air gun to melt the glue. This will allow complete separation of the good wood from the scrap wood.

Use the same technique of a hot air gun to remove the scrap wood from the top surface.

Many of my previous pieces are finished at this point, but with *Kilkea*, I did some shaping of the wings. I marked the areas to be cut away then removed the bulk of the wood using a coping saw.

Further shaping is done with a pneumatic die grinder.

For sanding, I use a variety of shopmade sanding tools.

Carving on the wings

Many of my previous pieces are complete at this point, but with *Kilkea* I did some carving on the wings. I marked the areas to be carved and removed the bulk of the wood with a coping saw *(Photo 44)*.

I refined the shape using a burr on a pneumatic die grinder and variety of shopmade sanding tools *(Photos 45, 46)*.

microwave oven and gradually heat it until the glue softens. This piece, however, was too large for my microwave, so I cut the carrier away on the bandsaw leaving ½" (13 mm) of scrap wood still attached *(Photo 41)*. This allowed me to use a hot air gun to melt the glue and separate the remainder of the carrier from the good wood *(Photos 42, 43)*.

Use the same technique to remove the scrap wood from the bottom surface. Any glue left on the piece can be softened with the hot air gun and wiped off with turpentine.

The lid, finial, and finish

The final steps are to make a lid, a finial, and to apply finish. I sprayed the top of the lid with India ink, which is what I also used to blacken the finial. The finish is Danish oil and then three coats of a matte nitrocellulose lacquer. ■


Untitled, 2007, Rimu,
4" × 4" × 12"
(10 cm × 10 cm × 30 cm)


Lidded container,
2005, Fiddleback Blackwood
(Acacia Melanoxolyn) 5" × 4" × 8"
(13 cm × 10 cm × 20 cm)

For twenty years, Brendan Stemp combined part-time woodturning with teaching art and craft. Richard Raffan and Vic Wood provided Brendan with his initial solid grounding in woodturning, as well as a desire to pursue woodturning full time. After a tentative start in 2005, Brendan now concentrates full time on making concert-quality recorders, production woodturning, gallery pieces, teaching, and demonstrating.