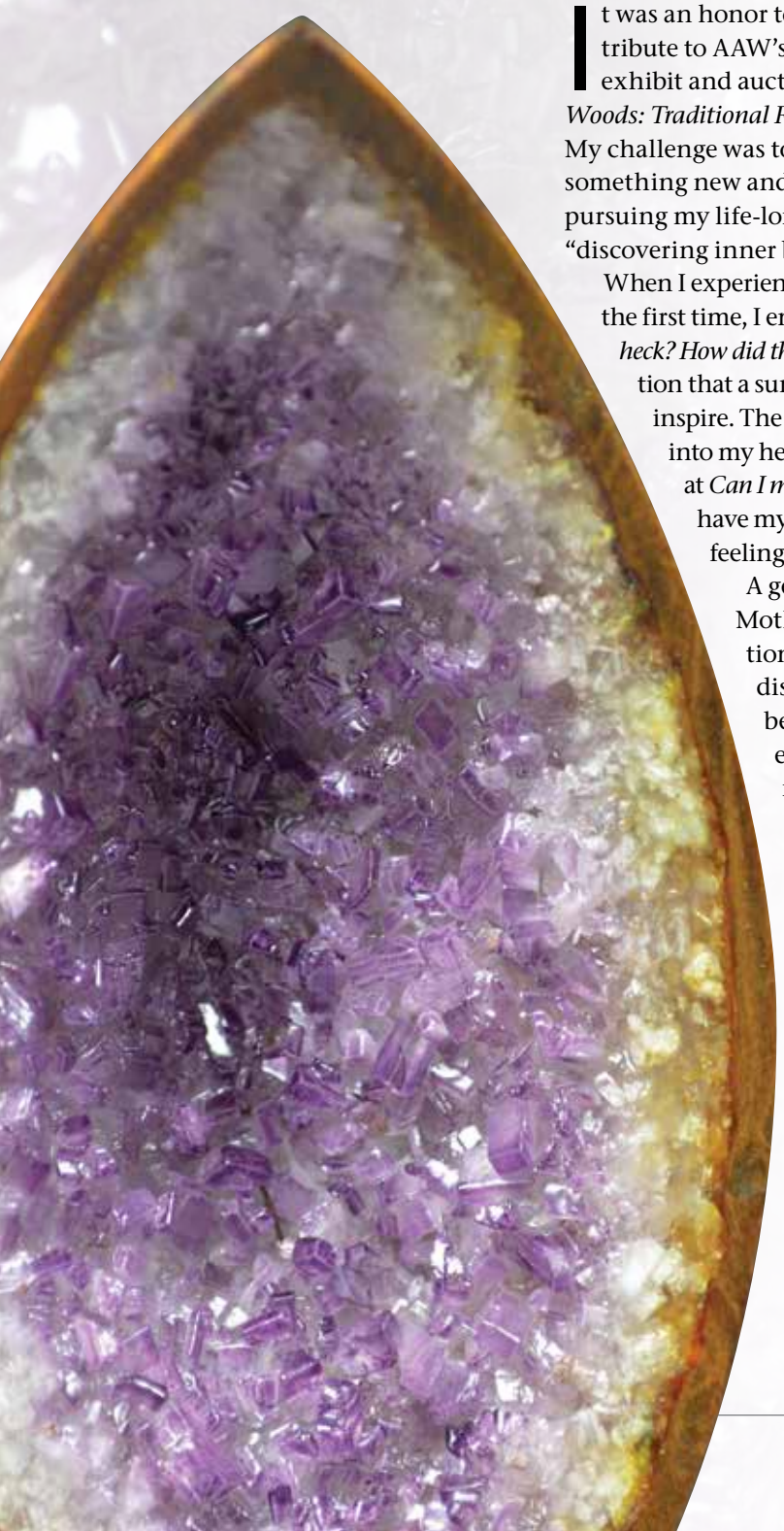
CREATING GEODES IN WOOD

Scott Grove



It was an honor to be asked to contribute to AAW's 2018 Symposium exhibit and auction, *Out of the Woods: Traditional Form Revisited*. My challenge was to come up with something new and different while pursuing my life-long artistic theme of "discovering inner beauty."

When I experience a piece of art for the first time, I enjoy the *What the heck? How did the artist do that?* reaction that a surprising piece can inspire. The questions that rush into my head inevitably arrive at *Can I make that?* I strive to have my work evoke these feelings in others.

A geode is one of Mother Nature's exceptional examples of discovering inner beauty. From the exterior, geodes are rough, unremarkable, sometimes downright ugly, and easily over-looked. Cut open, they can dazzle with the reflected light of thousands of crystal facets, sometimes in semi-precious gemstones such as amethyst and chalcedony. With geodes on the brain, I set off to emulate this natural gem by combining various materials into my turning to generate that sensation of curious puzzlement.

Geodes form over eons in natural voids in bedrock as minerals dissolved in ground water precipitate out of solution and harden. The exterior shape of a geode is dictated by the void in which it forms. I did not want my geode vessel to look too much like a uniformly-round turning; I wanted it to look more like an oblong hollow form split open to reveal its marvelous interior. I could have easily created a more realistic, rougher exterior, but I also wanted to add a touch of perplexity by including a hint of turned wood.

Untitled Geode, Redwood burl, crystal calcite, mother-of-pearl, brass, 6" × 6" × 3" (15cm × 15cm × 8cm)

Photos: Tib Shaw/AAW

Turn a basic bowl

Mount the blank and hollow out the bowl form.

Shape as much of the outside of the vessel as your tool allows you to reach.

True the rim and check that it is perfectly flat, as it will later become a gluing surface.

Start with a bowl

To establish the basic form to modify into the geode shell, I start by turning a 6" × 1½" (15cm × 38mm) shallow bowl. For this example, I use a well-seasoned redwood burl that has reached eight percent moisture content.

I mount the blank with a 5" (13cm) faceplate ring onto a four-jaw chuck with the top of the bowl oriented to the tailstock. I hollow out the inside of the form first with a bowl gouge, primarily using a shearing draw cut *(Photo 1)*.

This is a simple form, but it is important to create a uniform inside curve, so I periodically measure the depth of the bowl until I reach my desired 1½". The inside does not need to be sanded because it will be covered with crystals, but every cut is an opportunity to practice good technique and achieve the best surface I can off the tool.

With the form still mounted on the faceplate ring, I shape the few inches of the outside of the bowl that I can reach *(Photo 2)*. I keep a spherical shape in mind, visualizing a completely round bottom (a bowl without a foot). I sand the outside through 400 grit. My last cut ensures the rim is flat and has a nice crisp edge. The rim surface will become my gluing surface after the bowl is cut in half and reassembled, so I test it with a straightedge to be sure it is perfect *(Photo 3)*.

A rounded bottom and flat rim

Rechuck using either large plate jaws or a vacuum chuck and complete the outside of the form to a rounded, footless bottom.

After waiting overnight, re-true the rim on a flat surface using 120-grit abrasive.

To complete the exterior, I reverse the bowl and secure it on jumbo jaws *(Photo 4)*. This chucking arrangement provides unhindered access to the outside bottom to complete the smooth radius. I guesstimate how much to take off the bottom, guided by preliminary measurements of the internal depth and knowing the wall thickness is not a critical concern.

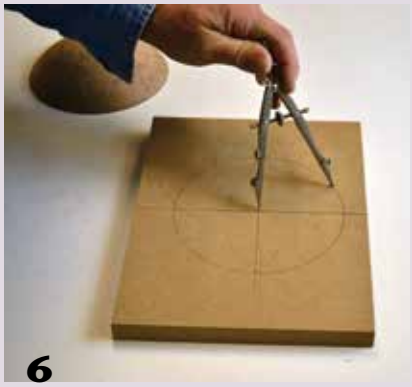
Most timbers have a tendency to move, or change shape, after milling, so I set the form aside until the next day to give internal stresses a chance to resolve themselves. The next day, to ensure the rim is still dead flat, I hand-sand it with 120-grit abrasive paper glued to a flat surface *(Photo 5)*.

Cut bowl in half

I trace the bowl's circumference onto a scrap of medium-density fiberboard (MDF) and bisect the circle to mark the center cut line. I then bisect the cut line with a perpendicular line drawn through the center of the circle *(Photo 6)*. All of this fancy footwork is done with a compass, and for those for whom geometry is a distant memory, there are many videos online that demonstrate how to bisect a circle.

I attach the bowl face down with double-stick tape and align the grain direction with the center cut line. I then use the perpendicular line and my dividers to draw two additional opposing curved lines for subsequent cuts. These curved lines are offset 1" (25mm) from either side of the ▸

Lay out cut lines



Use scrap sheet material as a carrier for cutting the bowl at the bandsaw. A compass and a recollection of high school geometry will help you identify the centerline and perpendicular axis.

Using the axis perpendicular to the centerline, draw an arc 1" longer than the radius on either side of the center cut line.

centerline, or 1" longer than the radius of the circle *(Photo 7)*.

With the bowl attached to the MDF, I use a bandsaw to cut the bowl in half down the centerline *(Photo 8)*; this is not a critical cut. I then cut the two opposing matching curves, preserving the lines and leaving a little extra material to be removed during the final shaping *(Photo 9)*.

I smooth out the cut using a spindle sander to sand to the line *(Photo 10)*. Keeping the bowl attached to the MDF allows for safe, square, and secure cutting and sanding.

Glue halves together

I apply a small amount of mineral spirits to release the double stick tape and lightly pry the bowl halves from

Cut and sand

Cut the bowl in half, then use the arcs drawn in *Photo 7* to guide the subsequent two cuts. Cut just outside the lines and leave a little extra material for final shaping.

Smooth the cuts up to the cut lines. A spindle sander makes the task simple, though hand-sanding with an abrasive on a flexible backing would work, too.

Glue halves back together

Apply a coat of dewaxed shellac to protect the exterior from glue staining.

Glue the two halves back together, joining them at the bowl's rim. Use painter's tape to provide clamping pressure while the glue dries.

the MDF with a putty knife. Then I seal only the outside of the bowl halves with dewaxed shellac to help protect the surface from excess glue *(Photo 11)*.

After dry-fitting and a minor spindle sander touch up to perfectly align the ends, I carefully apply glue to the rim edges and fit the two halves together by hand, wiping off any squeeze-out. Painter's tape is great for clamping the two halves together while carefully aligning the outside edge and tips *(Photos 12, 13)*.

Refine geode shell

After the adhesive has cured, I sand and touch up the mated edges. I fill any gaps in the seam with an acetone-based, quick-drying wood filler.

Any inconsistency in wall thickness from the initial turning will be evident as the turned bowl's rim is now exposed in cross-section at the points, and the former bowl bottom is on full display at the sides and probably will not match perfectly. To correct any aesthetic issues and to make the rim appear much thinner, I scribe the edge with a marking gauge set at ⅛" (3mm) *(Photo 14)*. Because redwood burl is soft and chips easily, I strengthen the outer-most edge with thin cyanoacrylate (CA) glue. Carefully applied, the glue seeps up to and down the scored seam, consolidating and firming up the wood outside of the scored line. Using a Dremel with a carving burr, I taper the inside wood to the scored line, leaving a ⅛"-wide outer edge *(Photo 15)*. I hand-sand the entire exterior and rim through 400 grit.

I like more contrast between the purple amethyst and the outer shell, so as shown in *Photo 16*, I apply a 50/50 mixture of Transtint amber and alcohol to the outside for a rich orange color (orange is a complimentary color to purple on the color wheel, so it maximizes aesthetic impact).

Seal the exterior

Several coats of satin lacquer seal and protect the stained surface. I lightly sand between coats, using 320-grit abrasive and being careful not to sand through the finish and into the dyed wood. I repeat the process, alternating between lacquer and sanding, until I have built up four or five coats. Redwood is soft and absorbs finish quickly, so I pay special attention to the endgrain, making sure the pores are filled with finish.

After the lacquer has cured (a quick process), I mask the outside surface and rim with painter's tape, cutting the excess off cleanly at the inside edge *(Photo 17)*. I scuff-sand the inside to remove any lacquer overspray and coat the tape with paste wax, being careful not to get any wax on the interior.

Line interior with crystals

Using a good clear epoxy, I make a thick, trowel-able paste by adding crushed mother-of-pearl flakes, finely crushed crystal calcite, and coarse calcite (all from easyinlay.com). *See Crushing Minerals sidebar for helpful tips*. I like Chroma-Craft's 2000G Epoxy Gel mixed according to the manufacturer's specifications because it out-performs other brands I have tried on vertical surfaces. This mixture should be thixotropic (thickened) and not runny. The mixture will produce a white base coat similar in appearance to that of a real geode.

To keep the epoxy mixture from spilling out, I use balls of clay to hold the form in position. I then apply the mixture to one side of the inside surface. I sprinkle a light additional layer of coarse calcite on the wet surface and press it lightly into the epoxy mixture ▸

Shape the rim


14


15

Mark the desired thickness of the rim and remove excess material. A rotary carving tool works well.

Finish and mask exterior


16

Consider dyeing the outside of the geode to either contrast with the crystals or perhaps evoke the appearance of stone. Then seal the exterior with lacquer (not shown).


17

Mask the rim and surrounding area with painter's tape, then coat the tape with paste wax.

with a wooden applicator *(Photos 18–20)*. After the epoxy cures, I tap the excess calcite out for reuse and repeat the epoxy/calcite/mother-of-pearl application on the other side of the form.

After the epoxy has set, I dump out the excess calcite, mix another small batch of epoxy, and brush a light coat over the cured epoxy/calcite/mother-of-pearl layer on one side. On this wet coat, I sprinkle another layer of calcite *(Photo 21)*. After this application cures, I dump the excess calcite and lightly stroke the inside surface with my finger to remove any pieces that are not securely attached. I repeat this second application on the opposing side.

At this point, the interior should be completely coated with calcite and mother-of-pearl. I carefully inspect the interior and look for voids or inconsistencies in the surface. I add single stones or a pinch of calcite dust as appropriate to fill voids and adhere the new addition with thin CA glue.

Add color

To color the calcite, I use shellac and Transtint, a concentrated, colorfast dye. I use a syringe to dispense the dye because I can measure using the fine-scale metric calibrations on the syringe. For the small quantities needed for this project, I simply count the drops *(Photo 22)*. The syringe creates smaller and more controlled drops than the bottle's dispenser.

I start with ten drops of dye to 20 ml (0.7 fluid ounces) of shellac and test the color by dabbing it onto my mixing table. If the color is a bit strong, I double the shellac, bringing it up to 40 ml (1.4 fluid ounces). A lighter color applied in multiple coats is preferably to a too-dark surface that is impossible to lighten.

With an airbrush set with 20 pounds of pressure, I spray on light coats, being careful not to allow the material to bead up *(Photo 23)*. I let each coat dry for about five minutes, then spray on another coat.

When examining a real amethyst geode, I notice the outer-most tips of the crystals are darkest and the bottoms transition to white, so I try to apply color only on the tips and avoid too much color on the bottom of the

Crushing Minerals

Crushing minerals into fine powder can be a challenge, even with a hammer or mortar and pestle. Material flies everywhere with those methods. Here is a better way: use a pipe and pestle.

Take a 12" (30cm) length of standard-threaded black pipe from a plumbing or big box hardware store. Any diameter of pipe can be used, but the size of the minerals that I want to crush dictates the pipe selection. For this geode, I started with coarse calcite and 1¼"- (32mm-) diameter pipe with an end cap to create finer material for filling small gaps (*Photo a*). This 12" pipe section functions as the mortar, and I cut about 3" (8cm) off its length to provide clearance for my knuckles when pounding with the pestle.

The pestle is made with a 12" × ⅜" (10mm) black pipe with an end cap on one end and T-connector on the other to act as a handle. The outside of the ⅜" end cap has to be ground down to fit smoothly inside the 1¼" pipe. I used my bench grinder, but a handheld angle grinder will do. Simply drop a small sample of the minerals into the pipe mortar and with a few blows with the pestle, you can quickly achieve a fine grind (*Photos b, c*).

Be sure to remove the threaded end cap and clean out any remaining dust if you are switching mineral types or color.

Line geode shell with crystals

Apply the calcite/mother-of-pearl/epoxy mix to one side of the interior of the geode, then sprinkle on more crushed calcite/mother-of-pearl and pack the mixture into place. After curing, repeat the process on the second side.

calcite. Airbrushing makes this fairly easy as the peaks of the minerals naturally catch the majority of the color.

Refine the rim

Once the dye is thoroughly dry, I carefully sand the excess calcite off the rim with the spindle sander *(Photo 24)*. When combining minerals and wood, it is easiest to work with softer materials like calcite and mother-of-pearl. These materials have a Mohs hardness of 2.5 to 3.0, while wood (not typically measured on the Mohs scale) ranges from 2 to 6. I sand the crystals flush with the wood, sanding through the tape on the edge and paying special attention to keeping the curve smooth and graceful.

I hand-sand the edge with a round sanding block, progressing to 400-grit abrasive, carefully removing all the spindle sander marks *(Photo 25)*. I remove the tape from the outside and clean any remaining tape residue with mineral spirits. Finally, I lightly round the sharp outside edge with a hard backing block and 320-grit abrasive, then use an air nozzle on the compressor to blow dust off the calcite.

I carefully apply more amber dye to the edge using a small paint brush *(Photo 26)*. The epoxy and CA glue help prevent dye bleed-through into the calcite, but care is still warranted. If any dye bleeds onto the epoxied calcite, I use alcohol to clean the contaminated surface.

Complete the finish

A quick application of spray lacquer on the edge and calcite unites the interior and exterior finishes. As before, sand the wood edge of the geode lightly between lacquer applications. ■

Scott Grove is a full-time professional woodworker and sculptor who specializes in veneering, casting, and alternative inlays. He lectures and teaches selectively across the U.S. and in the U.K. His studio is nestled in the hills of the Finger Lakes region of Western New York. His websites are ScottGrove.com for his own work and an educational site that links to his YouTube channel, ImagineGrove.com. *Scott extends special thanks to David Gould, "a skilled, well-experienced, generous and exacting mentor and burl collector."*

Add more crystals

21

Apply a second, lighter coat of epoxy using a paint brush, then sprinkle on more calcite/mother-of-pearl crystals. Let the application cure before repeating on the opposing side.

Apply color

22

23

Apply dye to the crystals to achieve the desired color. An airbrush provides a controlled means of developing color intensity.

Refine rim

24

25

Use a spindle sander, then a rounded sanding block to refine the rim and abrade the crystals flush with the wood.

Complete the finish

26

Touch up the newly exposed rim wood to match the exterior of the geode, then apply a few coats of lacquer to the interior and rim (not shown).