

TURNING A FITTED-LID BOX



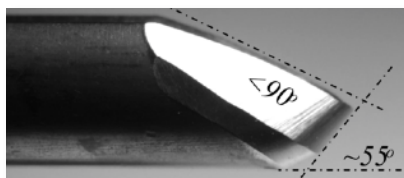
End grain box with "harmonic power-carving" texture, Breathing Box series (S. Maple, 2.75" dia. by 2.5" tall)

Turning boxes is a great exercise in precision, planning and refining your process of design. Boxes can range from simple to extremely ornate in their appearance, depending on your willingness to explore and express your artistic voice. Creating a lidded box requires a series of carefully calculated steps to produce a successful piece. While many turners find the planning involved in creating a refined fitted-lid box tedious, working through the 5 F's below will help with planning and increase your overall success. Consider the elements of Foundation, Function, Form, Feel and Finish to fine-tune your fitted-lid box making process. Spending time working on creating technical turnings like the box will elevating your craft and develop a depth of intention which effects all your creative work!

Foundation. "What equipment, materials and steps are needed to create an end grain box?"

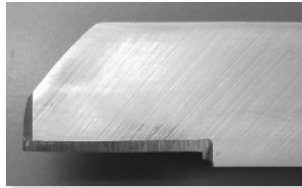
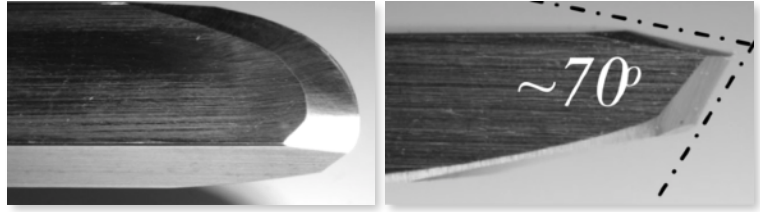
Equipment:

1. Radius Skew- A radius edge skew of 1" X 3/8" shank is extremely versatile in roughing the blank, fitting the lid and finishing the exterior form. My favorite cut used in turning boxes with cylindrical forms is a "peel-cut", with supported bevel and tool shank flat on the toolrest.



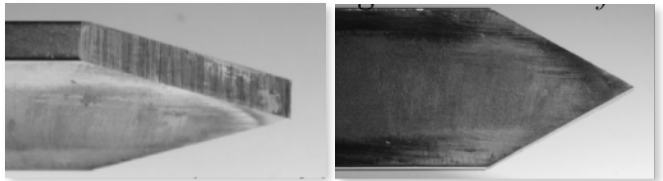
2. Fingernail Grind Bowl Gouge- A gouge of 1/2" shank diameter is a sweet size for turning most end grain boxes. The bowl gouge is a great compliment to the skew including delicate chamfering of edges, roughing the interior and preparing both the top and bottom surfaces of the box for embellishments.

3. Radius-Edge Neg.-Rake Scraper- Using a 3/8" thick scraper helps minimize tool vibration. Carefully selecting the right width/ radius helps create a clean interior form. When properly tuned for the species of wood being turned, this tool can refine and finish surfaces with little need for sanding.



4. 90-deg. Negative-Rake Scraper- While this tool is for finishing cuts only, I prefer a 3/16" to 5/16" thick scraper for increased precision. The profile is sharpened to a 90 degree angle. By aligning one edge of the profile with the tool shank, the lid recess can be cut with amazing accuracy using the ways of the lathe bed to visually align the tool.

5. Parting Tool- A 1/8" thick by ~3/4" tall parting tool, tuned for the cleanest cut, will serve for most applications. This parting tool is sharpened by laying the tool shank flat on its side on the grinder platform, then polished with a diamond hone. Both the leading edge (tip) and sides of the bevel can be used to slice wood cleanly.



6. Sandpaper- Once you learn how to tune your tools for maximum sharpness and how to present the edge for the cleanest cut, sanding is still an important but decreasing part of the process.
7. Lathe- Electronic variable speed (EVS) allows for tuning out vibrations during the shaping process. EVS also opens up a wide range of surface speeds for possible embellishments.
8. Four-Jaw Chuck or Faceplate- A chuck or faceplate of approx. 3" diameter is suited for turning end grain boxes up to 5" diameter and 6" tall. If using a chuck, ensure your spigot is turned to match the diameter, profile and depth to maximize your chuck's mechanical advantage.
9. Centers- A multi-spur drive center like a *Sorby Steb-Drive* will allow driving the blank without imposing undue stress to the blank. A high quality live center with sharp center point and mid-size cup will support the blank when between centers, while preserving the integrity of the blank by limiting the splitting forces inherent to cone shaped centers.
10. Light- A single-source light will allow visual inspection and feedback while turning. While a finely-tuned touch will get you started when striving for a pleasing form, reading the shadows allows visual feedback to refine the form to a much higher level. A light with a single point of origin will cast a single, crisp shadow line to visually evaluate both form and surface.

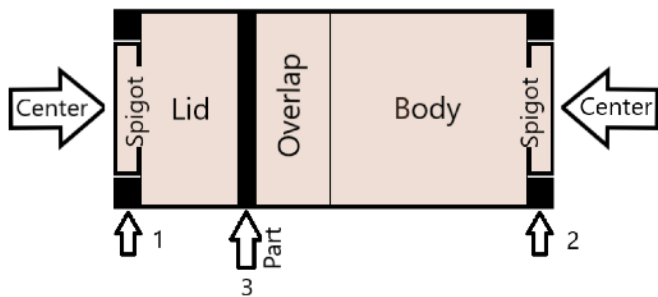
Materials:

Wood- Clean, even grained wood, 3” diameter by 5” long will give you plenty of wood to turn a ≤ 3 ” diameter by < 3 ” tall box. A shorter block of wood can easily be used if creating a box with less overlap in the joint and once you gain confidence in the process. I routinely select hard, evenly dense Sugar Maple, Eastern Cherry or Madrone due to availability in my region, consistency of turning and the ability to hold details from texturing and carving.

Progression/ Basic Steps:

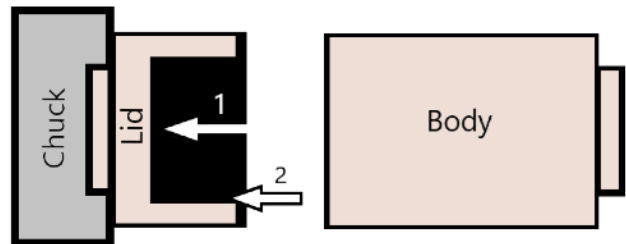
Once the blank is selected and assessed for grain orientation and defects, work your way through 10 basic steps to create a simple end grain box.

1. Between centers, rough the spindle-oriented blank to a true cylinder. Then, layout the spigots on each end, the joint overlap and the parting cut for separating the lid and body. Cut spigots at each end (steps 1 & 2 in diagram), then part the lid from the body (step 3 in diagram). While I routinely part the lid from the body using a 1/8” parting tool, cutting on a bandsaw (equipped with a V-block) minimizes waste.

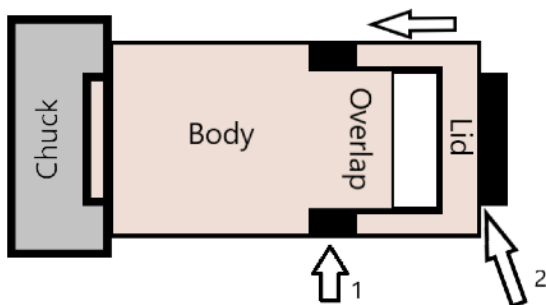


While I routinely part the lid from the body using a 1/8” parting tool, cutting on a bandsaw (equipped with a V-block) minimizes waste.

2. Mount the lid section in your chuck. Hollow out the lid (step 1 in diagram), leaving the wall slightly thick. Finish cut the underside (“ceiling”) of the lid, then use the 90-degree scraper to refine the inner wall of the lid so it is a clean mortise (step 2 in diagram), creating a clean internal cylinder that is parallel w/ the axis of rotation. Create a small chamfer on the internal edge of the mortise to help the joint align and to minimize binding when opening and closing the box.



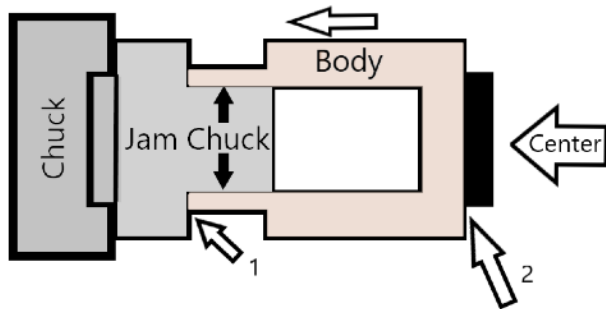
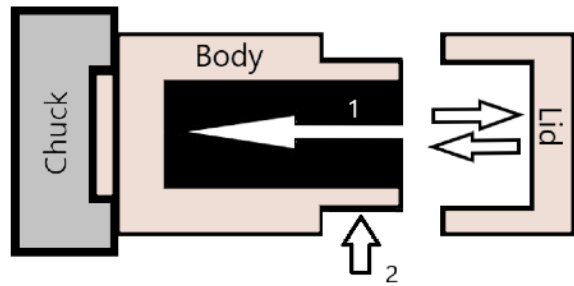
3. If using a 4 jaw chuck, mark the chucking spigot between jaws #1 and #4, for realignment and remounting if needed. Then, remove the lid from your chuck.



4. Mount the body section in your chuck. Double check and note the measurements of the lid mortise depth and diameter, then turn the tenon to mate with the mortise of the lid. For this cut (step 1 in diagram), I prefer using the skew to sneak up on measurement.

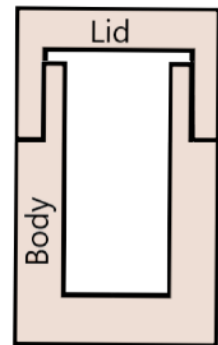
HINT: Turn the joint (tenon) as a slight taper of ~3-5 degrees with the smallest diameter toward the lid. Then, with the lathe off, test the fit by hand and create a burnish mark to locate the true diameter along the taper. Set lid aside and carefully turn the taper to the diameter of the burnish mark, test and repeat these steps until you reach the desired fit between lid and body for a light jam fit. Use the current fit as a jam chuck to finish turning the lid (step 2 in diagram). If the fit is loose, use one or two ply of paper towel to tighten the joint and proceed.

- Once complete, remove the lid and hollow the body (step 1 in diagram). I prefer to drill out the base to near finished depth, removing wood quickly and predictably. This is especially helpful when creating a box with a tall or narrow form. Using a negative rake scraper, tuned for the cleanest surface, complete the interior form of the body. Measure and mark the final depth. Before removing from the chuck, tune the fit of the lid (step 2 in diagram) and mark the chucking spigot between jaw #1 and #4, for realignment and remounting if needed. Then, remove the body from your chuck.



- Create a jam chuck using a waste block held on the lathe spindle (step 1 in diagram). Then turn the foot of the body (step 2 in diagram), using the tailstock and live-center for extra support. My preferred tool for this task is a freshly sharpened fingernail bowl gouge. Remove from jam chuck.

- Fine-tune the joint between the lid and body as needed using fine sandpaper (600-1000grit) by hand once off the lathe.
- Sign and apply your choice of finish to protect the wood.



Note: Many surface embellishments can be applied after the box is complete. A turner's specific set of skills and available equipment will dictate the possibilities for holding a finished box after the spigots are removed.

Function. “What is the purpose?”, is a question I ask myself whenever planning a new piece.

What do I want the piece to do? How can the elements of design work to create a feeling or transmit a message? Who is my audience? These are all questions which direct planning and create welcomed constraints for the creative process.

When it comes to making lidded-boxes, a common theme of function is a design to hold or protect a precious item. The questions of how large an item can be held, how it is held, how securely, etc. are all considerations which help drive the functional design of a fitted-lid box. All the decisions of internal and external forms, fit of the lid, how the box feels in someone’s hands and the choice of finish can either work to support of or in direct competition with the function of a piece.

With boxes, the interaction between the lid and body helps to communicate the function. Boxes are unique in that they have at least two parts, a lid and body. The fit of a lid can be any degree of tolerance from loose to a functionally permanent, jam fit, which goes together only once! The difference between these two extremes of fit is the tolerance of gap between parts. Another consideration is whether the lid is threaded or slip-fit. Creating either style requires planning and a specific set of skills and tooling.



*One-hand opening, Ringbox Series
(Pacific Madrone, 1.75" dia. by 1.75" tall)*

When considering the type of fit, keep the intent of function in mind. A loose fit may be desired if the box is intended to hold something delicate or the box is intended to rest on a surface, while one hand lifts the lid and the other hand retrieves its contents. Many woodturners are impressed by the technical skill required to create a “pop” fit... I regularly teach the techniques I use in creating a pneumatic, “breathing” fit which has an even smaller margin of error. While technically impressive, these types of fit may directly compete with the overall function of the box. Resist adding something just because it is “cool”, unless this feature supports the determined function of your piece.

The tolerance or gap between diameter of the lid and base requires special consideration of the wood species used and environment it will reside over the life of the completed piece; consider the specific wood species and what degree of

movement it will express with changes in temperature and humidity, and adjust the fit accordingly. The topic of how to properly select and season the wood used in the making of boxes is an entire presentation of its own. I recommend a practice of constant reflection and research with other woodworking specialists to learn what works in your climate and chosen species of wood.

Form. The external form of your box is the two-dimensional silhouette, as well as the way light casts across the surface to create shadows and your brain's interpretation of three-dimensions. The proportions of height-to-diameter, lid-to-base or joint placement and visual weight line or waist all come in to play when planning the external form. Within any single external form, a wide variety of internal forms are possible. The internal form is the shape of the interior. The internal form can intentionally support the external form or directly oppose it, typically operating within the constraints of, "The interior dimensions do not exceed the exterior dimensions."



*Grain highlight, Breathing Box series
(E. Cherry, 2.5" dia. by 2.5" tall)*

I encourage turners to play with form; create two-dimensional drawings to explore basic shapes and then extrapolate them into three-dimensional studies in how lighting casts shadows over the surface. Create your forms in



*Collaboration Eric Lofstrom &
Cynthia Gibson (2.5" dia. by 2.5" tall)*

wood, then paint the surface black. A matte finish will appear differently than a high gloss, note your reactions to each. With enough exploration, you will find certain forms appeal to your design aesthetics. Play with the proportions and features until you find what appeals to your tastes. While your taste may be a sterile cylinder or elaborately sculpted form, the silhouette will be a dominant feature and demands attention in the planning process.

Another factor which I consider to be a part of "form" is how the woods grain plays with the actual three-dimensionality of the box. Visual texture, such as wood grain often either supports or completes with form. In the same respect, any added visual or surface features like coves, beads and other embellishment patterns either help create cohesiveness in a piece, or distract and scatter the viewer's attention.

Feel. All components play into the "feel" of a piece; function, form (including fit), and finish combine with the feel of a piece to create its character. In this case, the little things ARE the big things. The combination of the smallest details adds a special synergy to create a kinesthetic connection with a piece of functional art.

The weight of a piece that is intended to be handled, the texture of the surface and finish used to either protect the wood or invite a natural patina, the way the piece and person interact with each other... the seemingly smallest details matter. Balance of weight is extremely important if a piece is designed to be handled. Weight can help communicate value, sophistication and intention, a sense of balance and consistency, or even help to give queues toward the intended function.



Sample box top texture #1, "Harmonic Power-Carving" (HPC) (Sugar Maple, 2.75" dia.)

Finish. Surface texture, or lack-of, can add to the overall appeal and thematic coherence of a piece. A textured surface can communicate a level of refinement, or rusticness, depending on the layout and contrast between the high and low points. Texture will never cover up a poorly executed form, however textures can distract from an otherwise appealing form. Refine the form and surface so the piece doesn't rely on the texture to cover up any distractions, then explore textures using scrap wood (of the same species and grain orientation) before applying to your piece. It is worth noting that most textures apply differently on side grain verses end grain.

Every woodturner seems to have their favorite protective finish. For me, the function dictates the choice of finish. If the piece is intended to be handled, a finish that helps create a soft, tactile surface may serve best. Some turners like a surface coating like lacquer or urethane on their work and others are drawn to the feeling of wood grain that results from a penetrating finish like an oil and soft wax. I like

to play with different finishes, depending on the intent of the piece; some receive several layers of dye, pigment, paint, sometimes even protected with a wiping varnish, while others are treated with a quick burnish using a handful of shavings and an oil-wax finish. As with the other F's, the choice of finish is worthy of exploration as it holds the potential to either strongly amplify or distract from the overall intent of your work. There is no hard-fast rule to choosing the "right" finish for a piece. Consider the intended function of the piece, think through which finish best meets the criteria and go for it. The finishing techniques you discover during your exploration add to the myriad of subtleties that make your work unique.



Sample box top texture #3, HPC (Sugar Maple, 2.75" dia.)



Sample box top texture #2, HPC (Sugar Maple)