

NOTES ON LIDDED BOXES



Introduction & Thoughts on Design:

Before beginning your box, decide whether you are going to turn a basic cylinder box with a flat top and bottom or a variation of this simple design. Egg shaped boxes are popular but are somewhat difficult to turn as the egg shape is tricky. You may want to experiment with using a detail tool or a chatter tool to decorate the top and bottom of the box. The inside of the box does not have to follow the shape of the outside of the box. For instance, if you turn a flat top cylinder box, the inside of the top could be domed. The ratio of the bottom to the top should be one of the following ratios as they are the most pleasing to the human eye: $2/5$ to $3/5$, $1/3$ to $2/3$ or $1/4$ to $3/4$. The Golden Section ratio is $3/8$ to $5/8$ or $2/5$ to $3/5$. They are so close that it just depends on how easily the math works out for me as to which ratio I choose. Actually, I rarely make any measurements, I just make the division by eye and have found that most of the time my division is right on the Golden Ratio.



1/4" Point Tool, 3/8" Skew & Box Scraper



Top & Side view of Box Scraper with Handle & Collet

Materials :

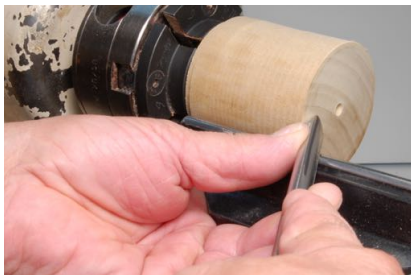
- Dry hardwood 2" to 3.5" inches in diameter and 5" to 6" inches long
- 1 1/4" Roughing gouge
- 3/8" Spindle gouge
- 3/4" Round nose scraper
- 1/2" Square nose scraper
- 1/4" Parting Tool
- 1/16" Thin parting tool
- 3/8" Box/Skew Tool (optional)
- Four jaw chuck
- Spur drive or Steb center



Procedure:

1. Mount a blank between centers.
2. Turn the blank to a cylinder.
3. Use a Parting Tool to put a 1/4" tenon on both ends with a proper shoulder for chucking the top and the bottom. The top of the chuck's jaws should rest squarely against the shoulder.
4. Measure the length of the box, making sure to leave room at the ends for the 1/4" tenon and allowing clearance for the Parting Tool when shaping the top and bottom in the chuck. Be sure to leave about a thumb's width of space between the bottom of the box and the jaws of the chuck to provide access for parting the bottom of the box off the lathe when you have finished turning and sanding the bottom of the box.
5. Mount the blank with the two tenons in the chuck with the end that is going to be the top of the box mounted in the chuck. Next rough shape the box, then mark the lid separation point and part off with a thin parting tool leaving the end that is to be the lid still mounted in the chuck.

**Note: Visually the best ratios for boxes are the following as they come close to the Golden Ratio 2/5 to 3/5, 3/8 to 5/8, 1/3 to 2/3, 1/4 to 3/4.*



Facing Off Cut using 3/8" Spindle Gouge



Starting the hollowing cut



Hollowing with 3/8" Spindle Gouge

6. With the top mounted in the chuck face off the top with a 3/8" spindle gouge or skew chisel.
7. Once the top has been faced off, use the 3/8" Spindle Gouge to begin hollowing out the lid.
**Remember To leave enough space on the edge of the lid for the mortise and some extra wood for the final shaping of the box after fitting the lid to the bottom of the box.*
8. Use a Parting Tool or Home made Box Scraper(see photo) to cut a recess (mortise) in the top for the bottom tenon to fit into. The recess should be 1/8" wide and 1/4" deep. Be sure to keep the side of the mortise straight and parallel to the bed of the lathe.



Top of the box partially hollowed ready for cutting in mortise



Using Box Tool to cut in mortise

9. Finish hollowing the lid and then sand the inside of the lid avoiding sanding the mortise as this must remain straight and parallel to the bed of the lathe.

Note: I use the following technique to hollow with a spindle gouge: Set the tool rest height so that when the gouge handle is horizontal to the bed of the lathe the center of the cutting tip is at the center of the piece to be hollowed. Push the gouge straight in to make the initial hole with the flute fully open. Push it in approximately 1/4" and rotate the flute toward you at about 45 degrees (11 o'clock). Then drag the cutting edge across the middle toward the outside of the box and begin hollowing. As the tool gets in deeper the tool will need to be drawn out of the box as it nears the outside edge of the box. Repeat this step until you have reached a depth beyond the usefulness of the Spindle Gouge (1 3/4" plus or minus), then switch to a round nose scraper.

Note: See handout titled "Tips & Techniques for Using a Spindle Gouge" for further instruction on the technique of hollowing with a Spindle Gouge.

Remember to check your depth often so that you do not risk going through the bottom when you later reverse turn the bottom. You also need to check the wall thickness to insure that it is even.

Finish hollowing the top, if the lid is to be round on the inside use a round nose scraper or if the inside of the lid is to be flat then use a square end scraper or box scraper. Please note that it is best to modify the round nose scraper by grinding the side of the scraper so that it can scrape the side of the box with the tool almost parallel to the side of the box. Once again the hand rest is set so that when the handle is level and parallel to the lathe bed the cutting edge is at the center of the piece to be hollowed. I hold the scraper with my forearm over the handle and my index finger pointing down the top of the scraper. With this method two things happen, when I move my finger the tool edge automatically goes in the direction that I point and two if I get a nasty catch my forearm prevents the tool from hitting my face.

Be careful as the scraper may grab when cutting the end grain at the bottom of the box. To minimize the tendency of the scraper to get pulled in by contact with the end grain, I grind a 5 to 10 degree bevel on the top of my scraper to give it a negative rake which makes the scraper a lot less aggressive.

10. Sand the inside of the top and apply finish being careful not to sand the recess or round it over.

11. Remove the top from the chuck.

Turning the bottom of the Box:

12. Place the bottom in the chuck.

13. Face off the top of the bottom. Remove as little wood as possible so as to minimize the grain mismatch when top and bottom are connected.



Bottom partially hollowed and ready for fitting tenon to mortise in lid

14. Before using a parting tool to cut a tenon for the top to fit onto the bottom, be sure to hollow out a portion of the bottom of the box to a depth of approximately 1" to 1 1/2" to relieve a bit of the tension in the wood to help assure a good fit when matching the mortice in the top to the tenon in the bottom. Cut a slight taper on the tenon so as to gradually sneak up on a tight fit. Test for fit frequently and try to avoid the urge to make one more cut as it usually causes a loose fit. I make the tenon just long enough to test for the fit so that I can start over again if the fit is too loose without creating more of a grain mismatch than necessary.

Note: The top must fit tightly because it will be jam fitted to the bottom of the box so that the top of the top can be turned to its final shape and sanded to completion.



Box bottom with tenon



Top fitted to bottom with tail stock pulled up for extra support until ready for final cut

15. Attach the top and finish shaping the outside of the top and the bottom of the box. Turn a decorative groove or feature to disguise or highlight the separation point of the lid and the bottom. Use gentle cuts when cutting the top as it will pop off if you get too aggressive. After all, it is only held on by friction.

Note: Be sure to align the grain of the lid with the grain of the bottom of the box to help insure a nice fit.



Lid attached and ready for finishing cut and sanding

16. Finish sanding and then remove the top.

17. Next it is time to finish hollowing the bottom of the box. Hollow the bottom using the same method that was used for hollowing the top. Remember to check depth and thickness frequently. Leave enough wood on the bottom to reverse turn the box and to insure that you do not turn through the bottom when finishing it in the jam chuck. Most importantly, do not forget to make the tenon at least 3/16" or slightly longer so that the top seats properly.

Using a Round Nose Scraper to finish hollowing the inside of the bottom



18. Sand and finish the inside.

19. Remove the bottom from the chuck.



Bottom fitted in jam chuck using a mortise in the jam chuck so that bottom can be turned and detailed



Bottom fitted into jam chuck using a tenon to fit the inside of the box

20. Make a jam chuck to reverse turn the bottom of the box. It is best to use a compression fit in the jam chuck. The box is placed inside a recess cut into the jam chuck. Once again, this needs to be a tight fit. Start out with a shallow groove and sneak up on the fit, testing often. Note that if you get a tight fit but the box slips a bit, you can take the box out and apply moisture to the jam chuck causing the wood to swell and thereby making for a tighter fit. Sometimes you can use a bit of toilet paper or paper towel to improve the holding power of the jam chuck.

21. Finish off the bottom making it slightly concave so that it will sit flat. Sand and finish the bottom.

22. Attach the top of the box to the bottom of the box and admire your newly finished box.

