

Basic Box Construction

Ron Giordano

Feb 2021

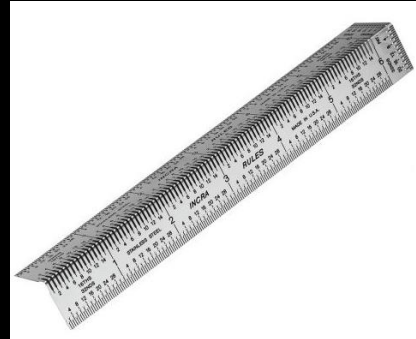
Recommended Reading/Viewing

- The best book I've found for the **practical** side of box making is David Freedman's book "Box-Making Basics: Design, Technique, Projects". The book was published in 1997 and I still refer to it frequently.
- In my opinion, Philip Weber is one of the most creative box makers. If you are looking for great source of **inspiration**, visit Philip's website at weberboxes.com.

Helpful Small Tools



Inkra 6" T-Rule



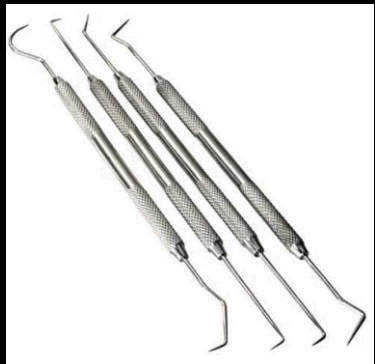
Inkra 6" Bent-Rule



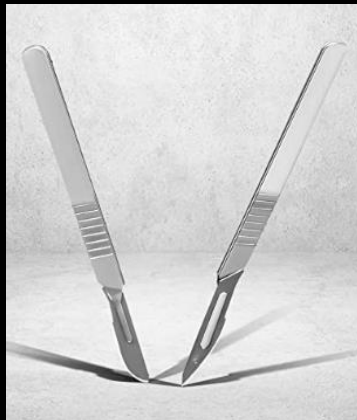
Rockler Glue Applicators



Woodcraft Large Rubber Bands



Dental Picks
(Amazon)



Scalpels
(Amazon)



Double-Sided
Golf-Grip Tape
(PGA Superstore Plano)



Magnifier
(Amazon)



CA Glue Applicators
(stewmac.com)

Helpful Large Tools



Inkra Router Table, Fence and Lift
(www.Inkra.com)



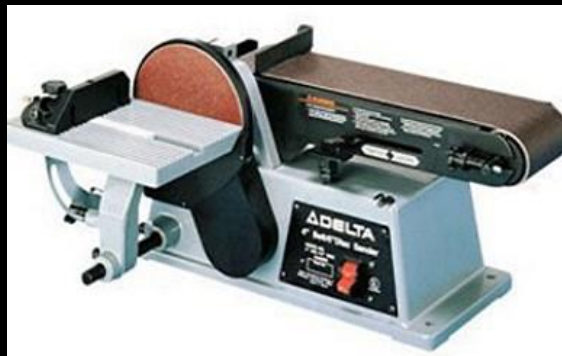
Super Max 19-38 Drum Sander
(supermaxtools.com)



Bandsaw



Byrnes Miniature Table Saw with 18" Table
(www.byrnesmodelmachines.com)



Belt/Disc Sander



Wishful Thinking

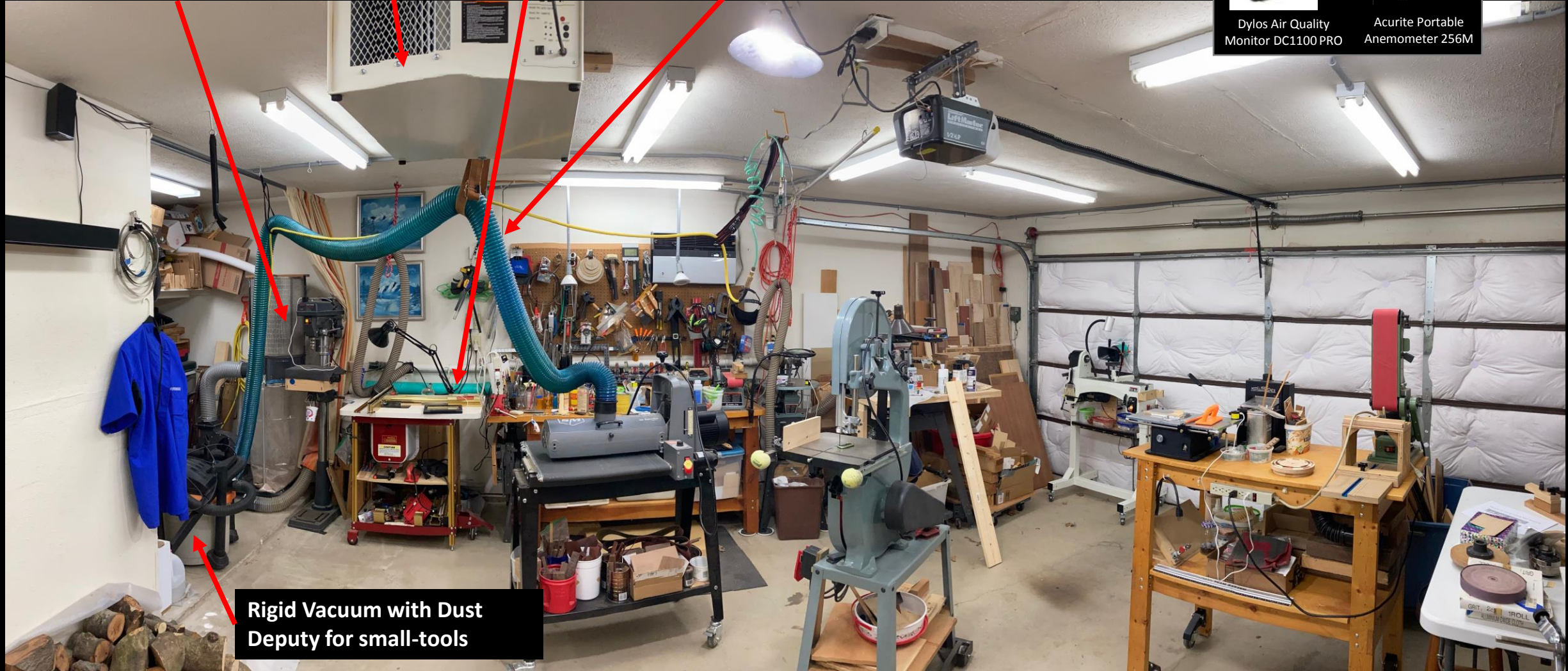
Dust Collection in My Garage-Shop

Harbor Freight Dust Collector retrofitted with a Thien baffle and a Wynn C1425C filter.

Jet Air Cleaner

Wall mounted 4" and 2-1/2" PVC Pipe

Rockler 4" Flex Hose hung from ceiling with luggage straps



Design Considerations: Dimensions

- Large Boxes

- Hinged lid
- $\frac{1}{2}$ " walls
- Partitions/Dividers



- Small Boxes

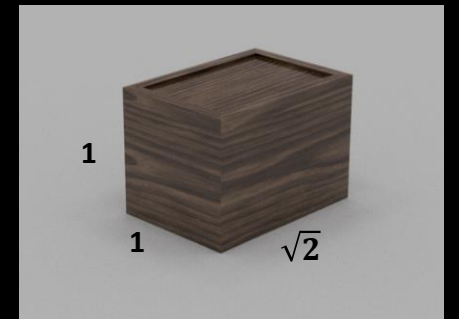
- Non-hinged lid
- $\frac{3}{8}$ " walls
- No partitions



Design Considerations: Aspect Ratio



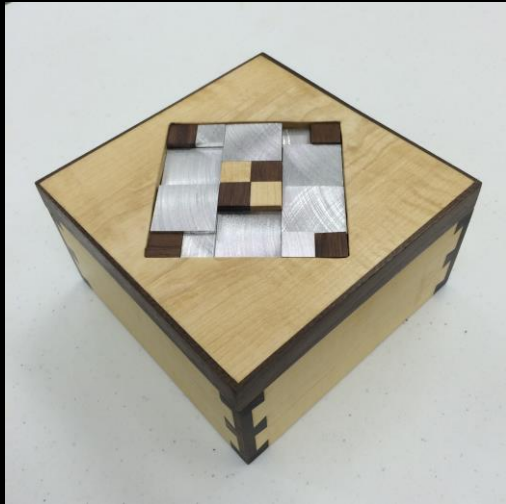
Golden Ratio
Aspect Ratio



Other Aspect Ratios

A good starting place, but nothing magical here.

Bad Designs



Clunky aspect ratio, awkward to open with one hand.



Lid too large, requires ugly chain to hold up.



Ugly hinges attached to back, rather than mortised.

Specialized Boxes and Considerations

- Humidors: Moisture control, no odor, Spanish cedar
- Urns: The rule of thumb is one cubic inch per pound of person
- Jewelry: Compartments and trays, flocking
- Ring boxes: Foam insert, engraving (laser/metal plaque)
- “Generic” keepsake box – easiest.

Three Typical Box Designs



Carcass-and-Panel
(Front Grain Continues into the Lid,
Floating Panels for Lid and Bottom)

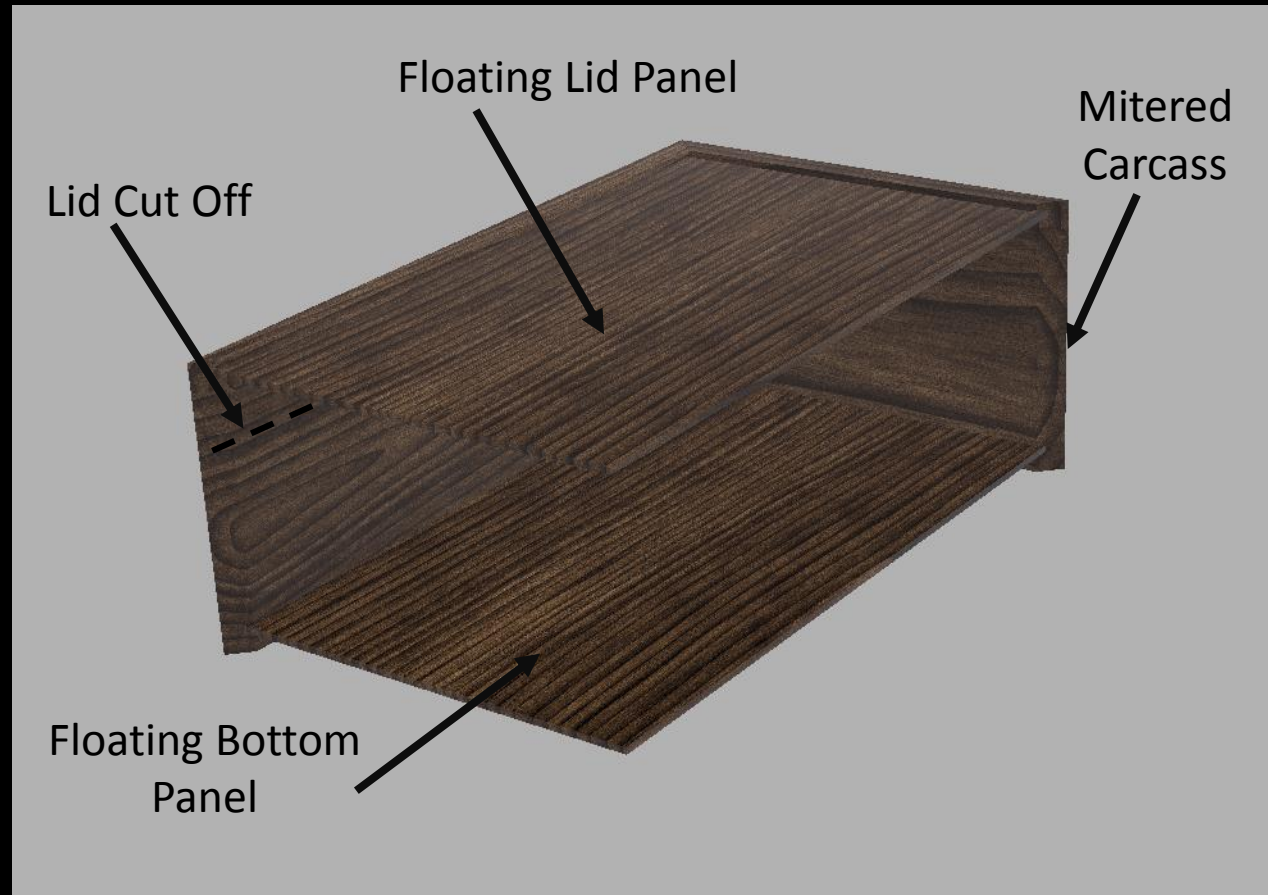


Picture-Frame Top
(Front Grain Does Not Continue into Lid)

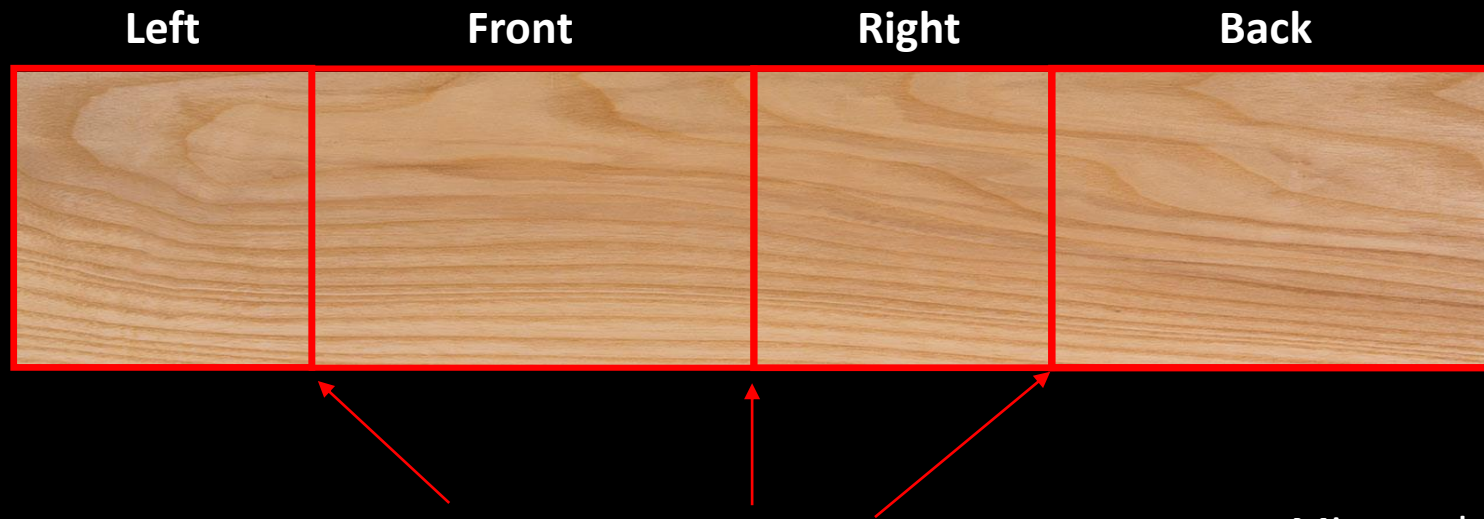


Solid Top
(Front Grain Does Not Continue into Lid,
Prone to Warping.)

Carcass-and-Panel Construction



Example Lay Out for Cutting



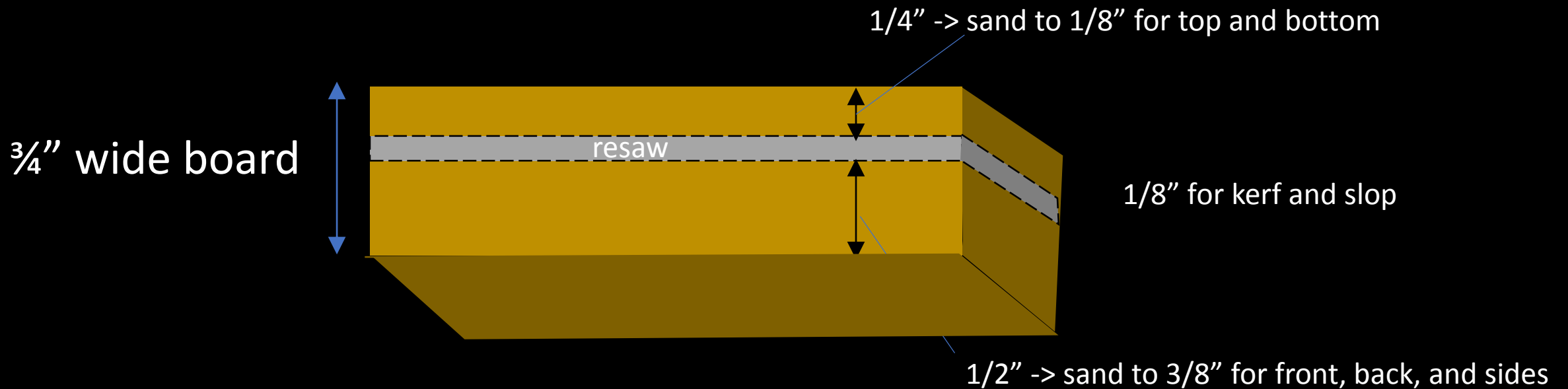
**3-Way Grain Match (kerf
will cause minor mismatch)**

Mismatched grain will be on back-left corner. Make sure it is not on front corner (i.e. don't place the Front piece on the right or left end of the board).

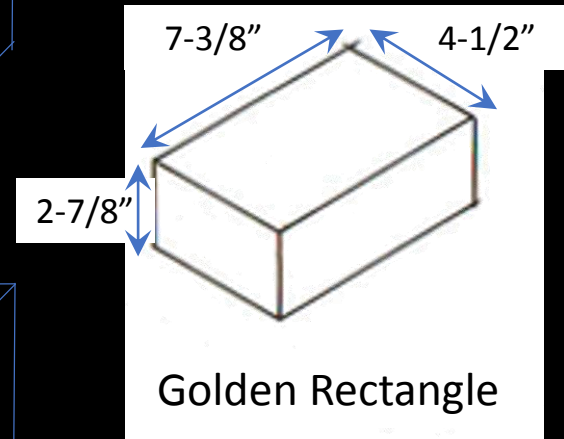
Note: A four-way grain match is possible if you resaw the board.

Resawing to Save Wood

- 3/8" or 1/2" walls are typical for front and sides
- 1/8" typical for top and bottom panels
- For 3/8" walls, you can resaw 3/4" (actual) stock to save lumber

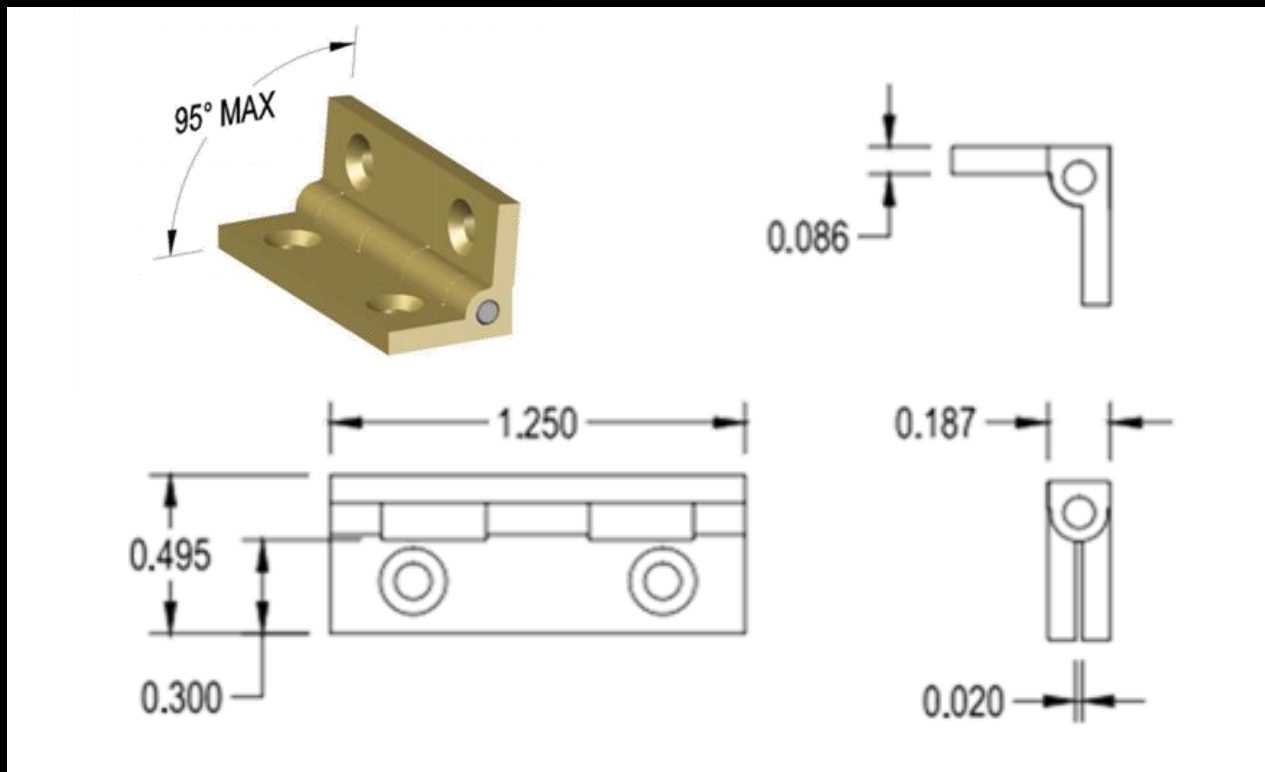


Example Lay Out for Cutting After Resawing



Brusso Hinges – Highly Recommended

Made in USA. The JB-102 has a built-in stop that **allows a lid to remain open at 95°**. It is milled from heavy brass stock.



\$39.99 per pair from Rockler
\$29.99 per pair from Brusso
Check out the once per year 50% sale.



Other Hinge Types



Quadrant Hinge



Arc is mortised into the side. Opens to 95°.



Side-Rail Hinge



Opens to 180° angle.



Blind-Pin Hinge (cut-off nail). Virtually invisible.



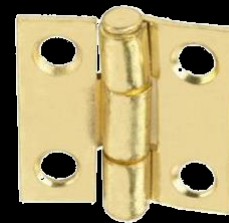
Piano Hinge. Opens to 105°. \$3.99



Barrell Hinge



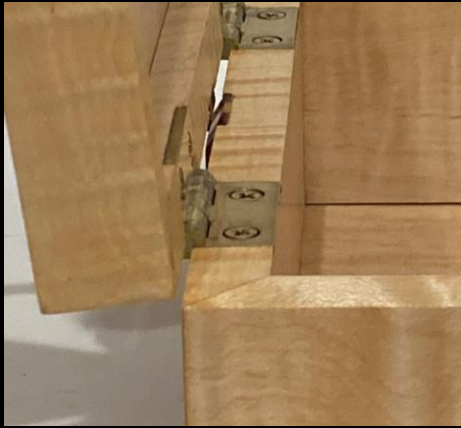
Minimally visible.



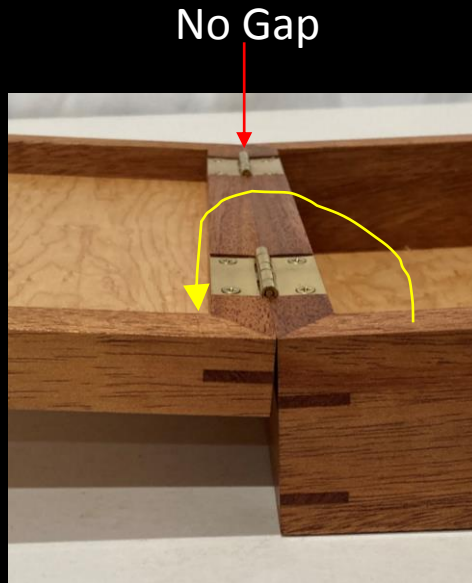
Butt Hinge

Nothing wrong with using this \$2.18 hinge from Home Depot.

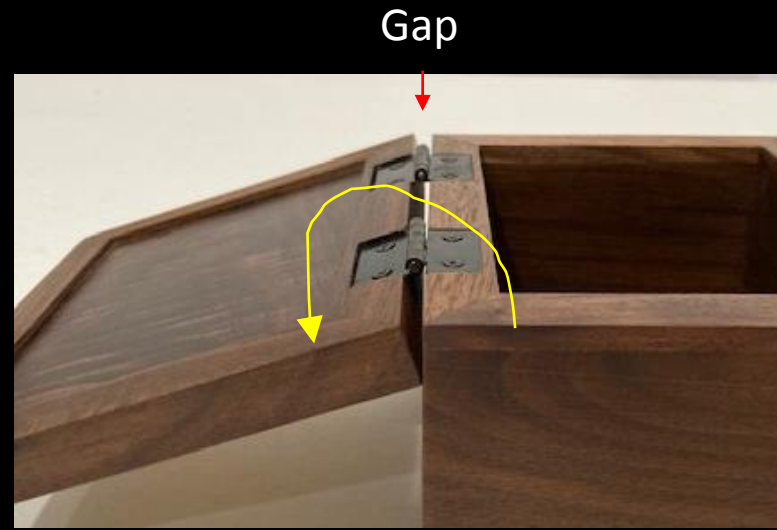
Lid Support and Hinge Placement



Self-stop hinges auto-support lid, but typically \$\$.



Non-stop hinges, installed without a gap between lid and carcass, will open to 180° and then stop



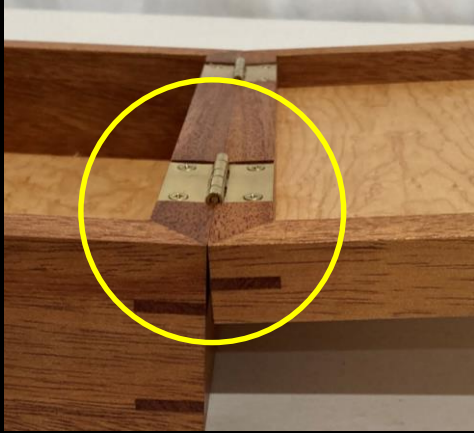
Non-stop hinges, installed with a gap between lid and carcass, will open > 180° before stopping.



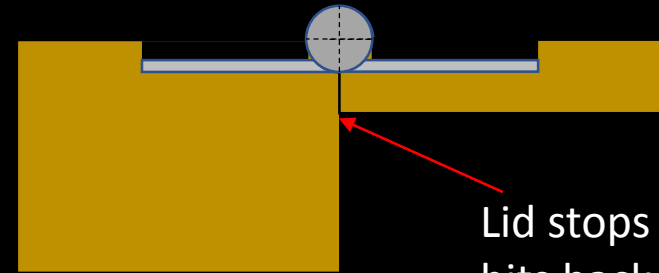
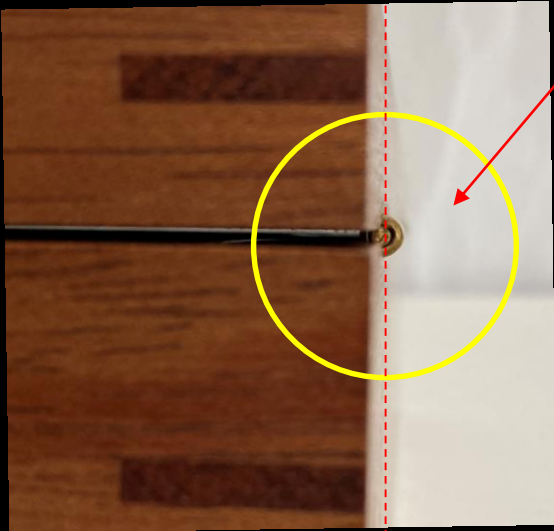
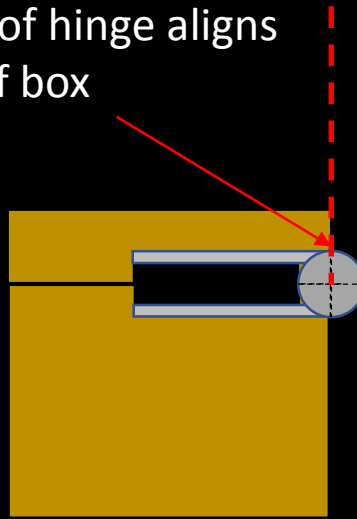
Chains can support lid, but are ugly IMHO

See following slides for details

Impact of Hinge Placement on Lid Movement



Center line of hinge aligns with back of box



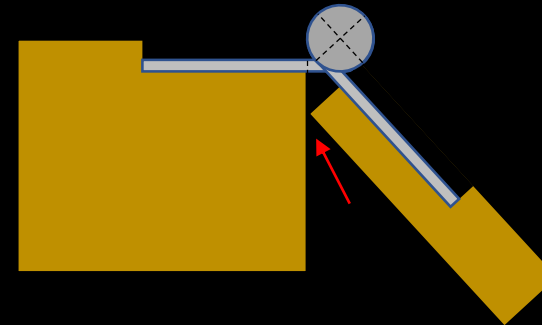
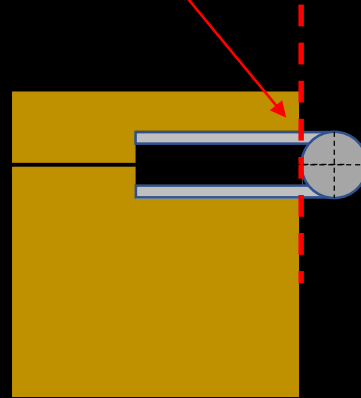
Lid stops at 180° as it hits back of box.

Impact of Hinge Placement and Lid Thickness on Lid Movement

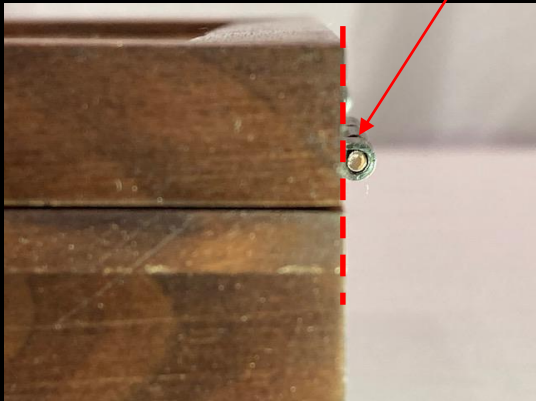


Left side of hinge aligns with back of box

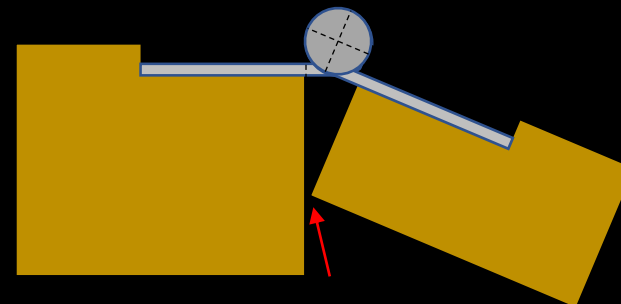
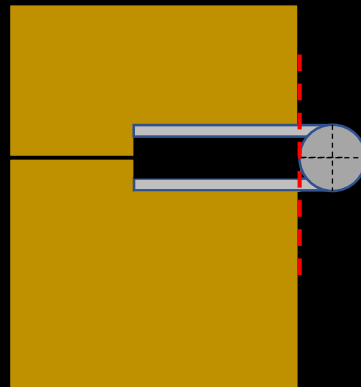
Thin Lid



Thin lid opens much $> 180^\circ$ before hitting back of box.



Thick Lid



Thick lid opens less than thin lid before hitting back of box.

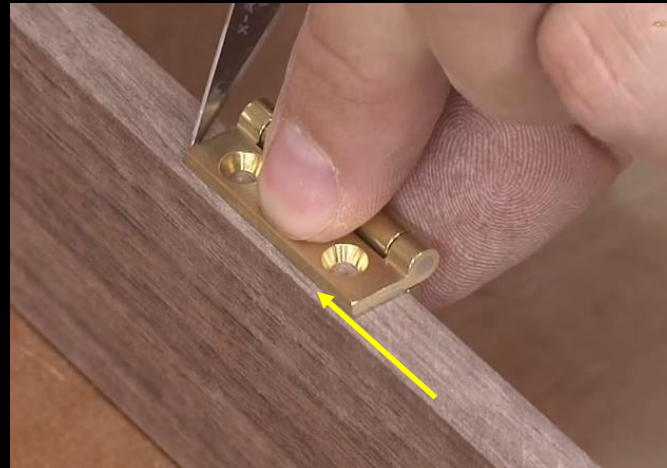
Through-Mortise vs. Partial-Mortise for Hinges

Before cutting any wood, I highly recommend, that you coordinate the wall thickness and the hinge width. Sometimes your box design will start with the hinge dimensions (!).

If you want a through-mortise design like this, then the wall thickness must equal the width of the hinge



If the box wall thickness is greater than the hinge width, then you will have to make a stop-mortise with the resulting thin piece of wood in front. Some people like that look, others don't. At least be aware of it.

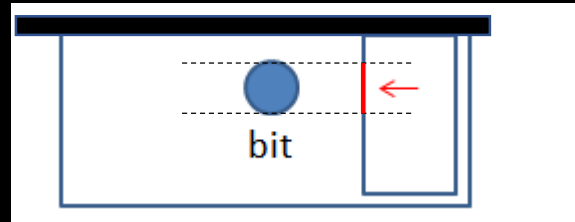


Hinge Installation

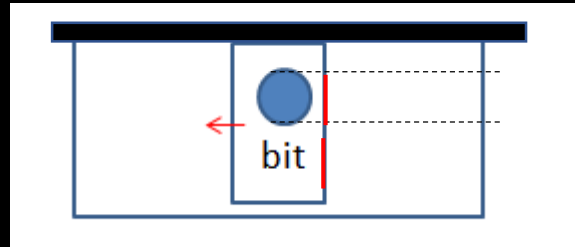
For a through-mortise design, the easiest approach is to cut the mortises on a router table. Adjust router bit height to $\frac{1}{2}$ of the hinge diameter.



Router Fence



Step 1: Flip box over and push it past the router bit to make the first mortise.



Step 2: Rotate box and place it over the router bit, i.e. the router bit will be hidden under the box. Then turn on router and push the box past the bit to make the 2nd mortise.

Repeat the above steps for the box lid. Creep-up on the fit. The hinge should fit very snugly into the mortise. You should be able to suspend the box from the hinge without the hinge pulling out.

Install hinges (no screws) and test fit that it closes flush at all sides. Then, predrill holes for the screws using a Vix bit, wax the screws, and install them carefully without stripping.

Oil Finish (e.g. Watco Danish Oil)

1. Apply a sloppy coat of oil (brush or wipe on)
2. Let the oil absorb for several minutes and reapply to the dry spots.
3. Immediately, wet sand with 150 grit sand paper. You should see a slurry form. Wipe off the slurry.
4. Over the next hour or two, check for any oil that pools on the surface. Wipe it off.
5. Wait a day.
6. Repeat steps 1-5, but with 180 grit, then 240 grit, then 320 grit, then 400 grit.
7. Wait a week or more and then apply a paste wax (optional)

Fixing Mistakes

- Bad Miter
 - Belt Sand
 - Screw driver compression
 - Sand glue into crack
- Dents
 - Stream and/or hot water

Other Reading

How to Make a Simple Wooden Box With Mortised Hinges

By penaltyboxwoodshop in Workshop > Woodworking 2,884 20

CC BY-ND 4.0

Download

Favorite



<https://www.instructables.com/How-to-Make-a-Simple-Wooden-Box-With-Mortised-Hing/>

Pick the Perfect Hinges for Your Boxes

The right choice will help you design and build better boxes

BY DOUG STOWE

Selecting just the right hinges to fit each special box can be a daunting task. There are so many types that it's tough to make the right choice. And you don't want to make a box before choosing the hinges—that's like painting yourself into a corner. To help you wade through the options, here I'll give a brief look at the different hinge types and their applications.

There are three main criteria to consider when you're deciding which hinge will be right for your box. First is appearance. Do you want to see the whole hinge on the outside of the box, see a proud brass barrel at the back, or just glimpse a barely visible barrel tucked into the lid joint? Another key factor is the size of the box and the weight of the lid. Some hinges are more robust than others, but in certain cases you can use multiple pairs of less substantial hinges to bear the weight. One aspect of hinge choice that tends to be forgotten is the installation difficulty. Some hinges simply screw right to the surface, some require cutting a complex mortise, and some require a specialized cutter to make a slot for the hinge. Understanding each type's strengths and weaknesses will let you refine your box design and find that perfect hinge each time.

Doug Stowe is a professional furniture maker and boxmaker in Eureka Springs, Ark.



50 FINE WOODWORKING

<https://www.finewoodworking.com/membership/pdf/226625/W259STcorrected.pdf>