Basic Box Construction

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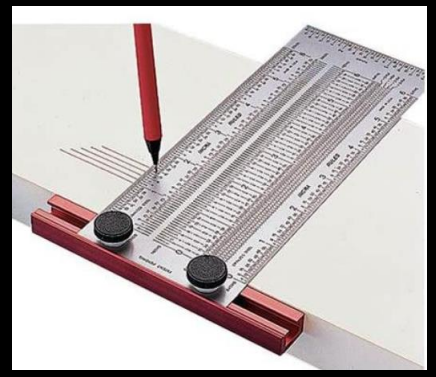
Recommended Reading/Viewing

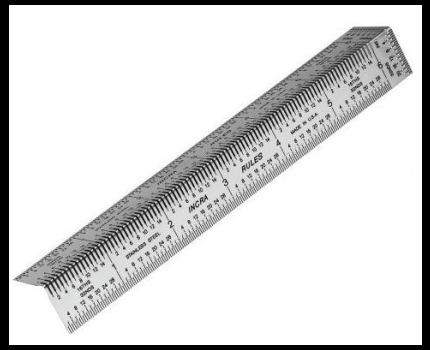
- The best book I've found for the practical side of box making is David Freedman's book "Box-Making Basics: Design, Technique, Projects". The book was published in 1997 and I still refer to it frequently.

- 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



Incra 6” T-Rule

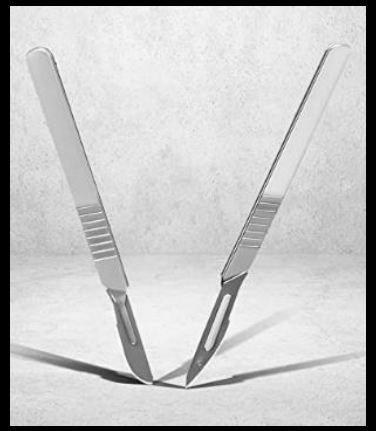


Incra 6” Bent-Rule

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)

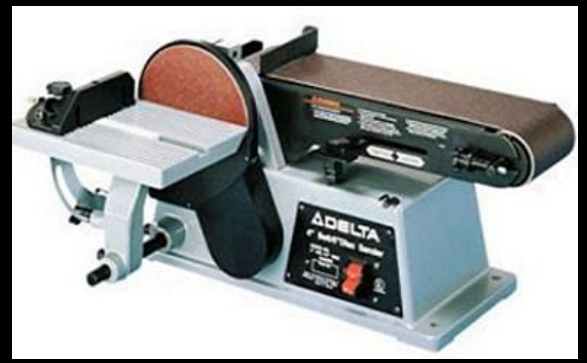
Helpful Large Tools

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

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

Bandsaw

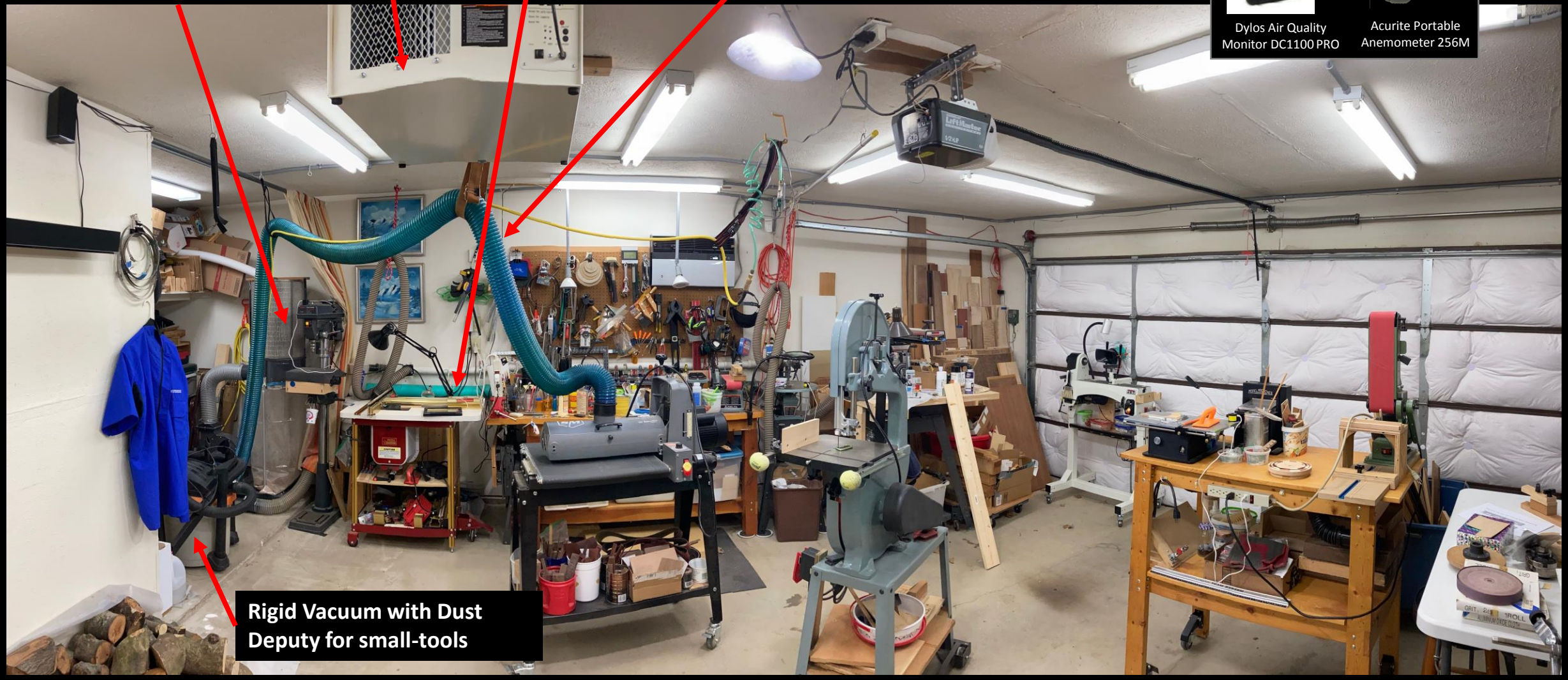
Byrnes Miniature Table Saw with 18” Table
(www.byrnesmodelmachines.com)



Belt/Disc Sander

Wishful Thinking

Dust Collection in My Garage-Shop



Dylos Air Quality Monitor DC1100 PRO

Acurite Portable Anemometer 256M

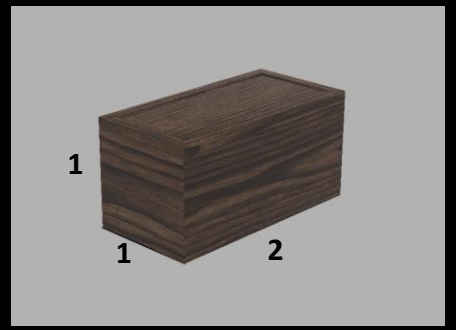
Design Considerations: Dimensions

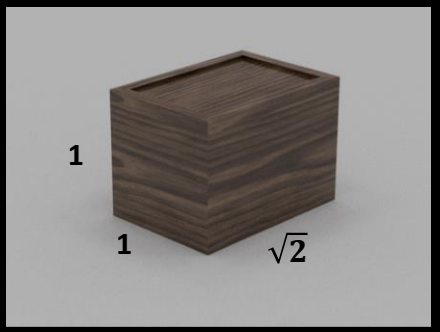
- Large Boxes
  - Hinged lid
  - ½” walls
  - Partitions/Dividers

- Small Boxes
  - Non-hinged lid
  - 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 to 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.

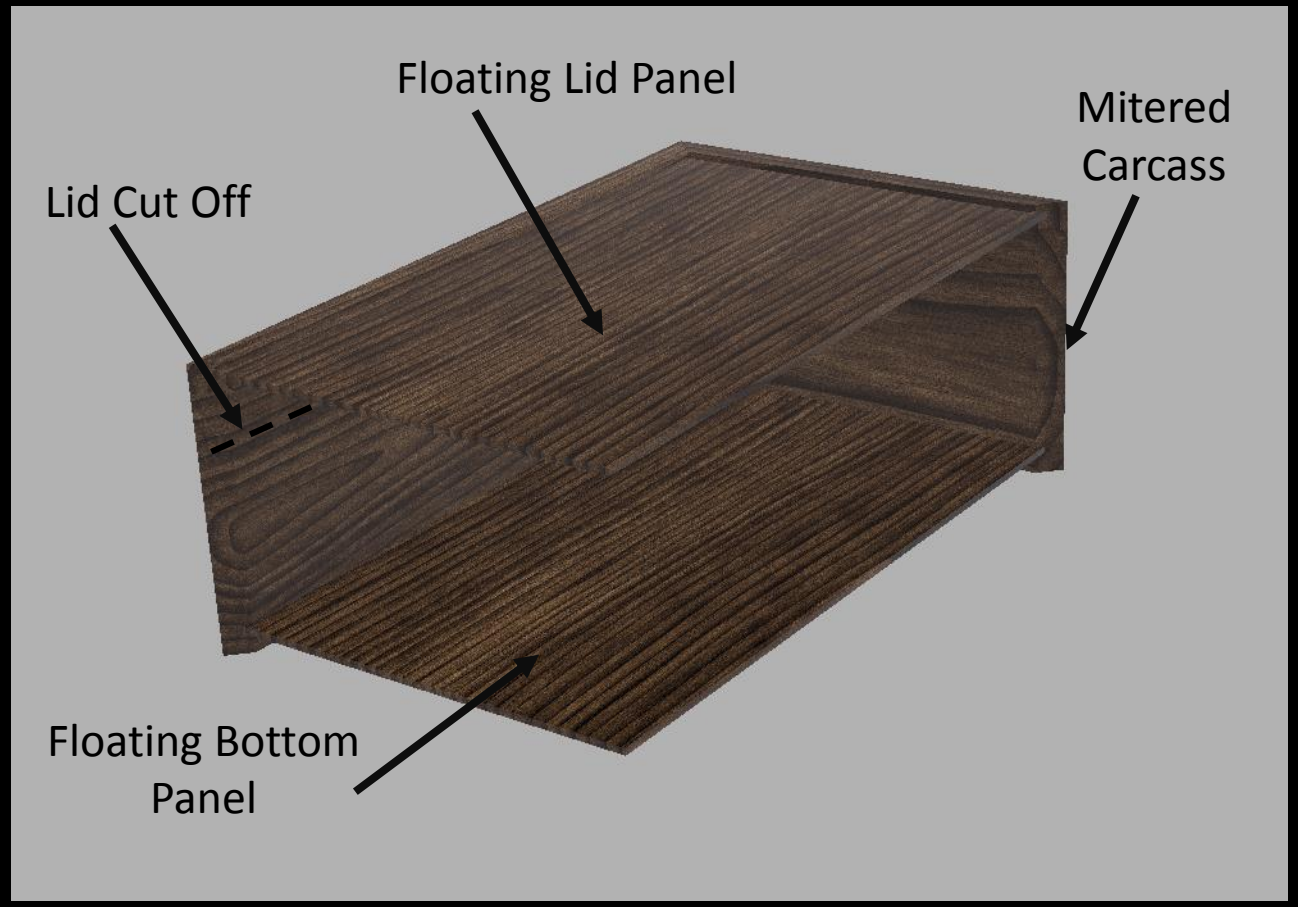
Three Typical Box Designs

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

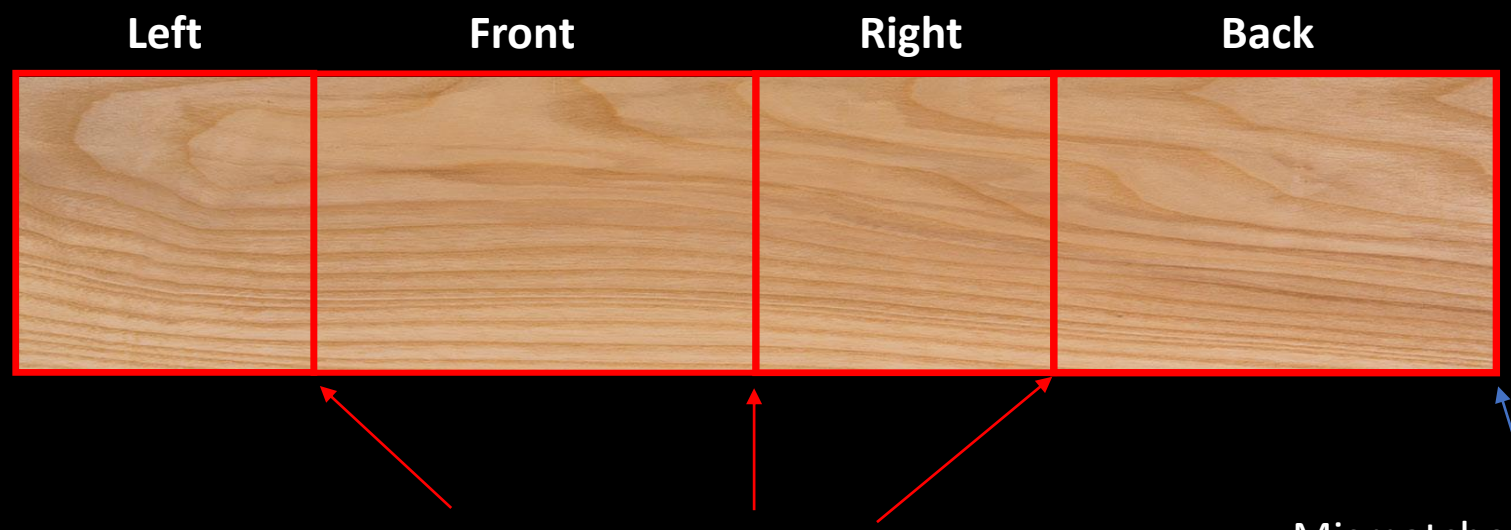
Picture-Frame Top
(Front Grain Does Not Continue into Lid)

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

Carcass-and-Panel Construction



Example Lay Out for Cutting



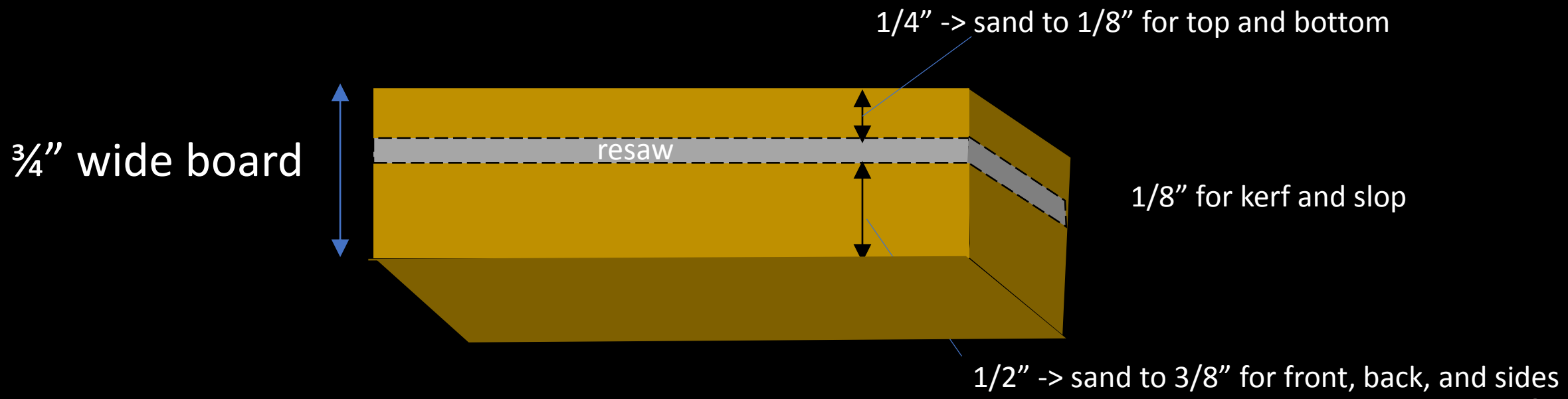
3-Way Grain Match (kerf will cause minor mismatch)

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.

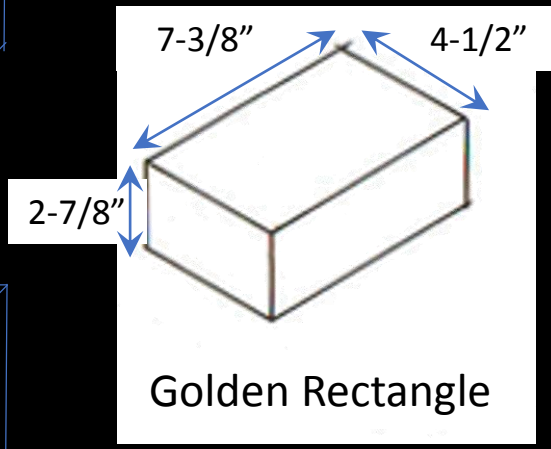
Note: A four-way grain match is possible if you resaw the board.

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 ¾” (actual) stock to save lumber

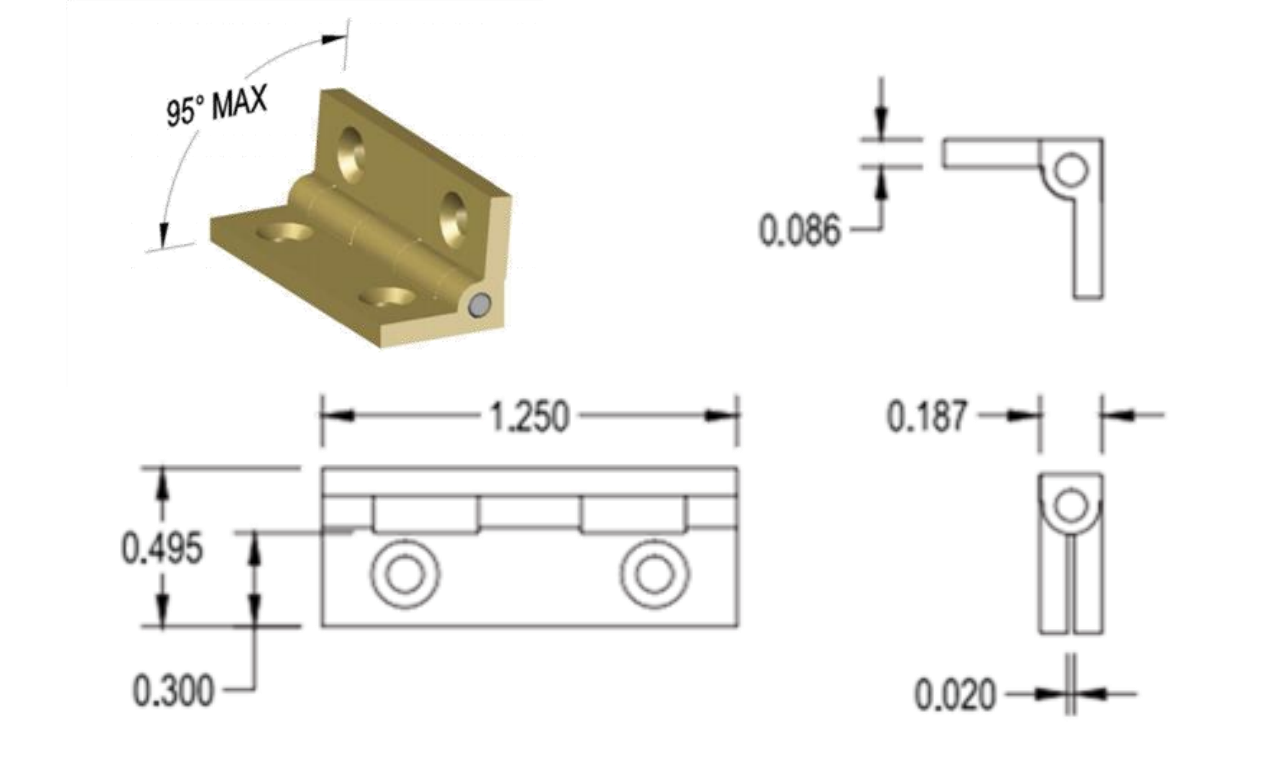


Example Lay Out for Cutting After Resawing



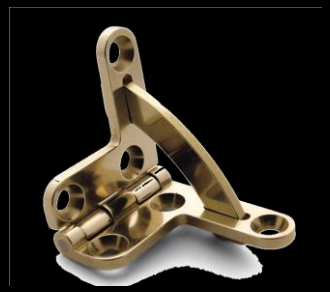
Brusso Hinges – Highly Recommended

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.

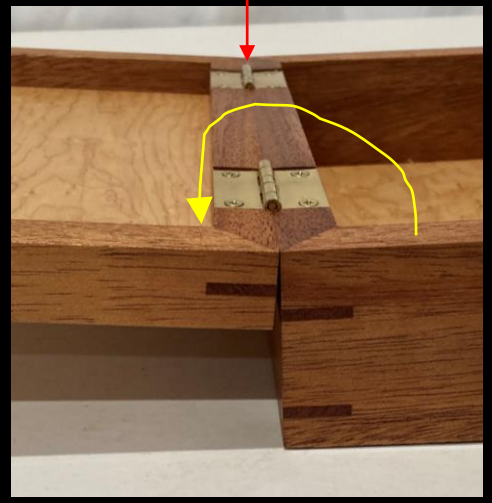
Butt Hinge

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

Lid Support and Hinge Placement

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

No Gap



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

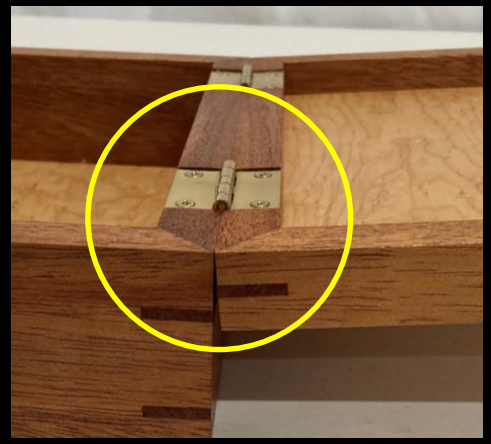
Gap

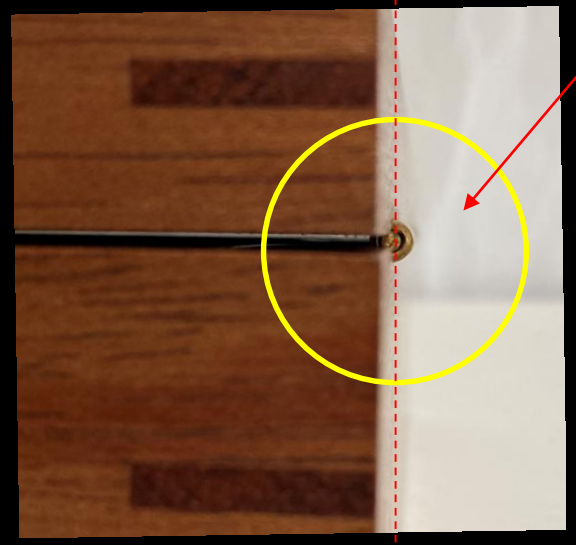
Non-stop hinges, installed with a gap between lid and carcass, will open > 180° before stopping.

Chains can support lid, but are ugly IMHO

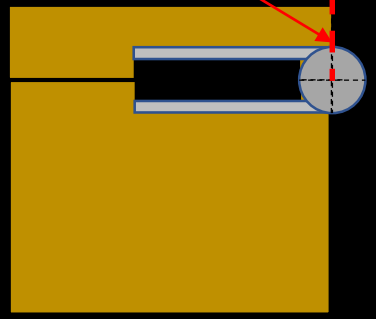
See following slides for details

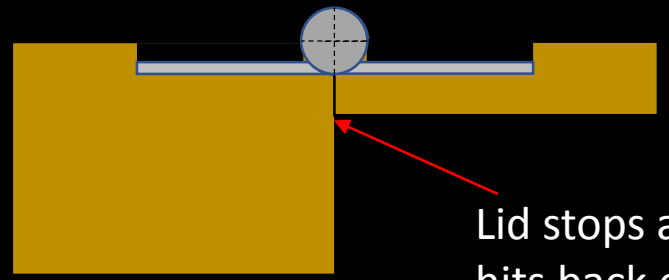
Impact of Hinge Placement on Lid Movement





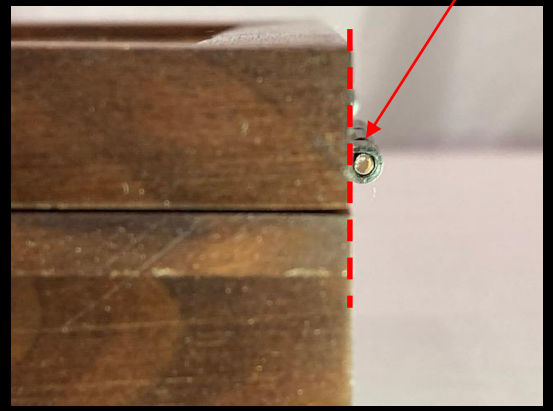
Center line of hinge aligns with back of box





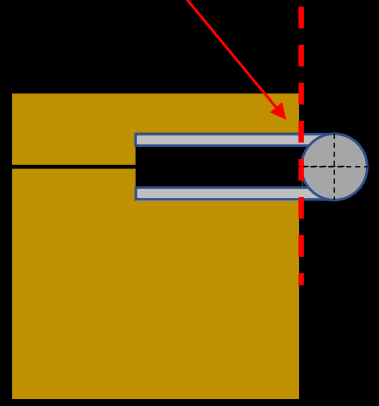
Lid stops at 180° as it hits back of box.

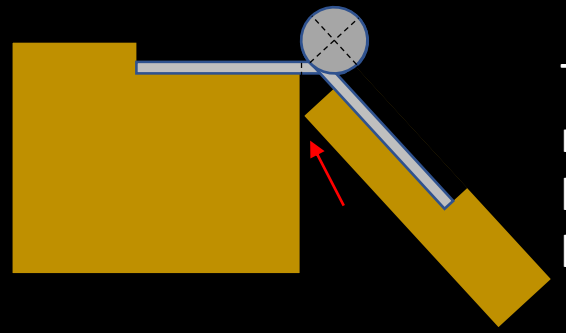
Impact of Hinge Placement and Lid Thickness on Lid Movement



Left side of hinge aligns with back of box

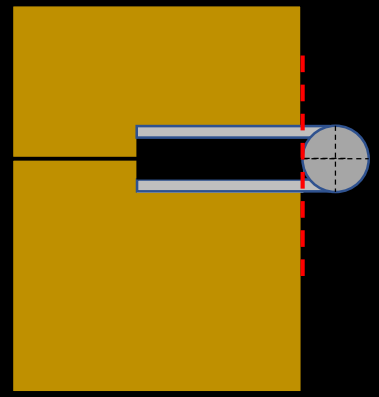
Thin Lid

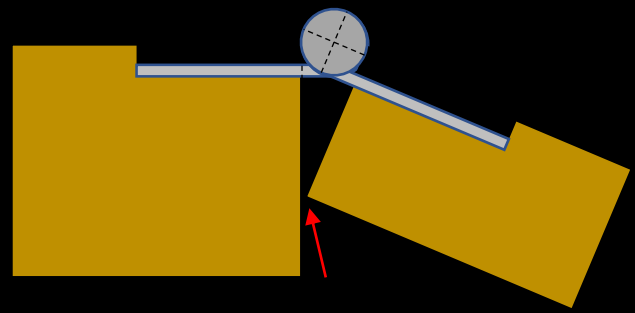




Thin lid opens much > 180° before hitting back of box.

Thick Lid





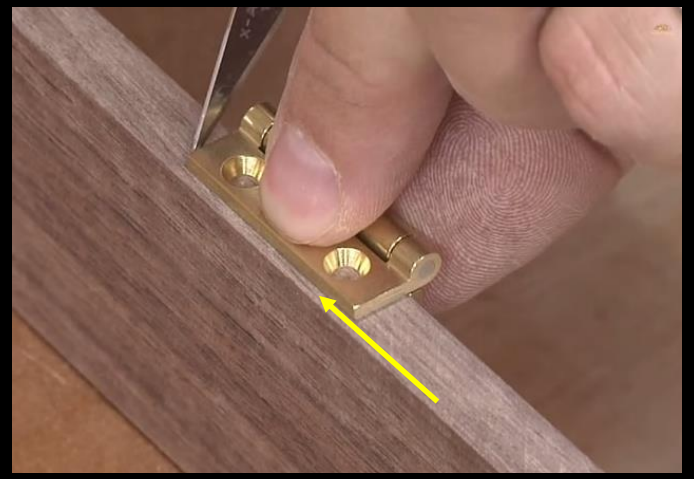
Thick lid opens less than thin lid before hitting back of box.

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 (!).

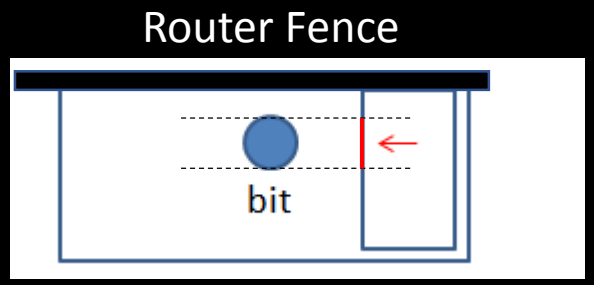
If you want a through-mortise design like this, then the wall thickness must equal the width of the hinge

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.

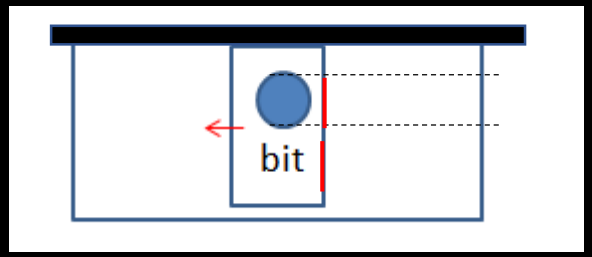


Hinge Installation

For a through-mortise design, the easiest approach is to cut the mortises on a router table. Adjust router bit height to ½ of the hinge diameter.



Step 1: Flip box over and push it past the router bit to make the fist 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

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

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