Lynn's Box Cutting Jig

This is a box joint jig for the table saw. I wish I could take credit for it but it was designed by Lynn Sabin. It is simple, inherently accurate, inexpensive, and works really well. What more can you ask from a shop jig?

The design of the jig is such that you can rapidly cut perfect box joints on your table saw with a minimum of setup and without the need of a dado cutter.

Most box joint jigs require a dado cutter and a precisely machined peg to do their job. Any tolerances in the jig will accumulate in the joints and show up in the final box joint. This design eliminates the cumulative tolerance and with one jig you can cut 1/8", ¼", 3/8", ½" or any other box spacing you might desire. Additionally it allows the cutting of multiple pieces simultaneously to really increase production speed.

The jig is elegant in it's simplicity. The carrier bolts or clamps to your mitre fence and has a threaded rod which indexes the carriage. The carriage is positioned precisely due to the pitch of the threaded rod which has negligible cumulative error over it's length.

Operation of the jig is simple. Turn the indexing knob, make a cut, repeat. All of the metal parts of the jig are threaded with a 3/8-16 thread. This means that each full turn of the index knob moves the carriage relative to the carrier exactly 1/16" of an inch. If you use a 'T' knob as I did you can easily count ½-turns of 1/32" inch each.

In the entire thread and on the web page a '½turn' is a unit of measure and NEVER a modifier. If I want to say two-and-a-half turns I write it as 2½ turns (rotate knob 900°) vs two half-turns which is written as 2 ½turns (rotate knob 360°)

Since the rod is 3/8"-16 then one full turn indexes the carriage 1/16". Only problem is that if you have a 3/32" blade you need to be moving in increments of 1/32" and NOT 1/16" — thus the need for ½turns. Since the jig is built with a T-knob making a ½turn is easy as the arms of the T are naturally 180° out. So you can easily make ½turns.

Most TS blades have either a 1/8" or 3/32" kerf. Mine in particular (a Freud 50T carbide) has a 3/32" kerf. If we wish to cut, say, a ¼" box joint, each finger will be 8/32" wide. The first pass with the 3/32" kerf blade will leave 5/32" remaining. Turning the index knob 3, ½-turns indexes the workpiece a kerf's width. After a 2nd cut turning the index knob 2 ½-turns and making a third cut completes the first notch. Then you simply turn the index knob 11 additional ½-turns to index to the next notch and repeat the process:

- *Cut*
- *Index 3 half-turns*
- *Cut*
- *Index 2*
- *Cut*
- *Index 11*

Note that the total index for each cycle is 3 + 2 + 11 or 16 ½-turns for a total repeat of ½" between teeth. This is for a 3/32" kerf. If we were using an 1/8" kerf the pattern would be

- *Cut*
- *Index 4*
- *Cut*
- *Index 12*

You can use this same principle to cut other patterns no matter what the kerf is set to.

Endplay between the index knob and carrier is critical and must be controlled. I threaded an acorn nut on the end and then jammed the index knob against it. This was followed by a regular nut that in turn jammed the knob. This prevents the knob from rotating in either direction. Finally a washer was added and the rod passed thru the right side piece of the jig. Another washer and then a pair of jam nuts allowed me to set the endplay to essentially zero and lock it there.

The carriage has TWO 'Tee nuts' on it facing the opposite way. This prevents the Tee nuts from coming loose from the wood. Once the rod is threaded thru both, they will maintain the same spacing as the forces pushing one out are cancelled out by the exact same force pushing the other in.

While you can certainly clamp the jig to the miter fence, I drilled out mine to attach directly to the fence with a couple of 1/4-20 bolts, washers, and wingnuts. This allows you to take off the auxilliary fence and replace it with the jig in a matter of seconds without tools.

Normally you make your widths a multiple of a pin/notch. This allows you to cut all four sides at once and flip a pair of them over after they're cut.

You can use a dado blade. If you have a ¼" blade then you'll index 8 full turns (moving the workpiece exactly ½" after each cut. Note that the total number of turns for a given pin spacing is always the same no matter what the kerf is.

If you have ¼" kerf then you:

- *cut*
- *index 16 ½turns*

If you have 1/8" kerf then you:

- *cut*
- *index 4 ½turns*
- *cut*
- *index 12 ½turns*

If you have 3/32" kerf then you:

- *cut*
- *index 3 ½turns*
- *cut*
- *index 2 ½turns*
- *cut*

- *index 11 ½turns*

Note that the total number of ½turns is always 16 in all three examples — this is because the pin/notch spacing is ½" or 16/32" and 1/32" = ½turn.

You align the carriage so that the inside corner is tight to the left side of the blade.

As for the kerf varying, you can compensate by under/over indexing (non-cumulative) for the first cut on each tooth. This will loosen/tighten the joint. A ½ turn is 1/32" a ¼ turn is 1/64" and an 1/8th turn is 1/128" or about .008". You can easily estimate 1/8 turn or less and you can consistently dial on the first index. This is one of the beauty's of the Lynn Jig over even the Incra, you can rapidly and easily compensate for both kerf width variations and you can intentionally make a 'sloppy' joint to use as a hinge or you can intentionally make it 'hammer' tight!

Make a couple of practice runs on scrap and you'll rapidly figure out if your blade is under or over without having to get out the micrometer.

You can make any width fingers that you want. Cutting a ¾" finger will take sometime with a 3/32" kerf, but there is nothing that prevents you from doing this.

Say for example you wanted to cut ¾” fingers on a 10” board. Notch is the same as finger so a ¾" finger and a ¾" notch gives a 1½" pattern. This implies that your panels should be a multiple of 1½" wide. This will force your panels to 9” or 10½" instead of 10".

A 1½" pattern is 24 full turns or 48 ½turns per repeat. (1 turn = 1/16", 1½" = 24/16" so 1½" = 24 full turns x2 = 48 ½turns)

When you start, you'll always start on a notch. Your first cut will remove 3/32" of material. Then you'll index 3 ½turns (3 ½turns = 3/32").

So the overall cutting pattern is:

- *cut (3/32" notch)*
- *Index 3 ½turns*
- *cut (3/16" notch)*
- *Index 3 ½turns*
- *cut (9/32" notch)*
- *Index 3 ½turns*
- *cut (3/8" notch)*
- *Index 3 ½turns*
- *cut (15/32" notch)*
- *Index 3 ½turns*
- *cut (9/16" notch)*
- *Index 3 ½turns*
- *cut (21/32" notch)*
- *Index 3 ½turns*
- *cut (¾" notch)*
- *Index 27 ½turns to next notch*

Note that we've indexed a total of 48 ½turns or 1½". We have to index 27 ½turns to skip the tooth and allow for the 3/32" kerf at the start of the next tooth.

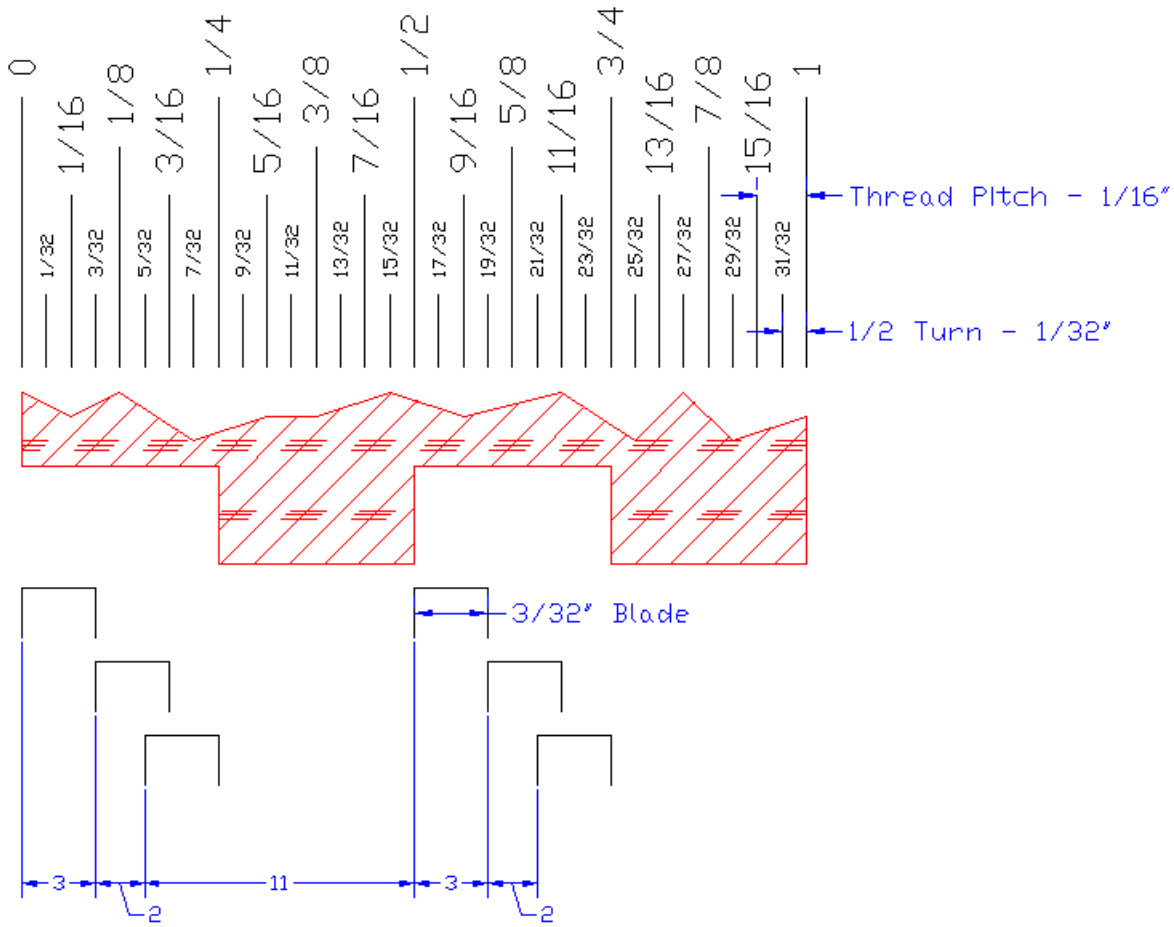
When you cut you're cutting both ends of all four pieces as two pairs before you index.

Assume that you have the two long sides taped as a set as well as the two shorter ends.

You start with the carriage at the zero position (the inside of the left end flush with the left side of the blade). You'll cut one end of the sides, flip it, cut the other end, change to the end pieces, cut one set of ends, flip, cut the other set of ends and *THEN* index!

If my blade has a 3/32" kerf and I turn 1 full turn, I'll have a slot 5/32" wide (3/32" from the first cut, index 1/16", and make 2nd cut).

Perhaps a drawing will help everyone visualize what is going on here. This is showing making ¼" fingers on a ½" spacing:



As for slop, when you assemble the jig the jam nuts allow you to take all of that out. There's no perceptable lateral slop in the fixture when it's

adjusted right. The opposing T-nuts keep the carraige on the rod with no lateral slop. The jam nuts on both sides of the right end (where the knob is) dial out any endplay at that point. The left end can float because the right end completely determines the reference position.

Some say that box joints look best when the thickness of the stock is the same as the dimensions of the box. Using half inch stock, both the pin and the slot of the box joint would be a half inch cube. Actually you must cut 'em that way for them to fit. If they're shallower the fingers won't come up to the surface. If they're proud they'll project out. So the only way to make the edges come out even is to have the cutter depth exactly the thickness of the stock (this also implies that the sides are all the same thickness.) I usually cut 'em just a hair (maybe 1/64" or less) deeper so the fingers are a touch proud. Then I can sand the ends until flush and everything comes out smooth.

Don't worry about square to the table. That will buck out. Hold *TIGHT* to the corner of the carriage.

When you set up the tool the easiest is to align the left edge of the blade with the inside left edge of the carriage. The blade shouldn't take anything off the left guide block. So you're starting with a notch. Note the angle of the knob at that point. That is your reference for all other turns. As you crank every time the knob is at that particular angle is when you count a half or a full turn.

Now this is not to say that it's absolutely critical. I normally "round off" so that the knob is vertical or horizontal at that point. This will give you a slight offset when the sides are assembled, but I normally do an all four side trim pass anyway. Typicaly I take of 1/32" from the shallow edge with the top of the blade just at the top of the stock. This is done after assembly and glue up and gives you absolutely flush corners. You could also sand at that point, but I find ripping on the saw easier.

Sometimes you'll find that the fingers on the 4th corner are shifted slightly when you assemble. This is normal and you can press the pieces until they align. Next, to get the boxes apart after dry fit, place them on a *corner* and press down on the opposite corner. Once it starts to go, press it FLAT and the joints will release. Then fold the two-piece sections back on themselves and when they're flat the joints release completely. Wiggling and trying to pull it apart doesn't work easily. Finally, add a little water (just a few drops) and mix well with your yellow glue or use white glue to give you more working time. Be sure to paint all of the mating surfaces (not just between the fingers) with glue. A small "acid" or "plumbers" brush (the cheap ones with the metal handles) works well.

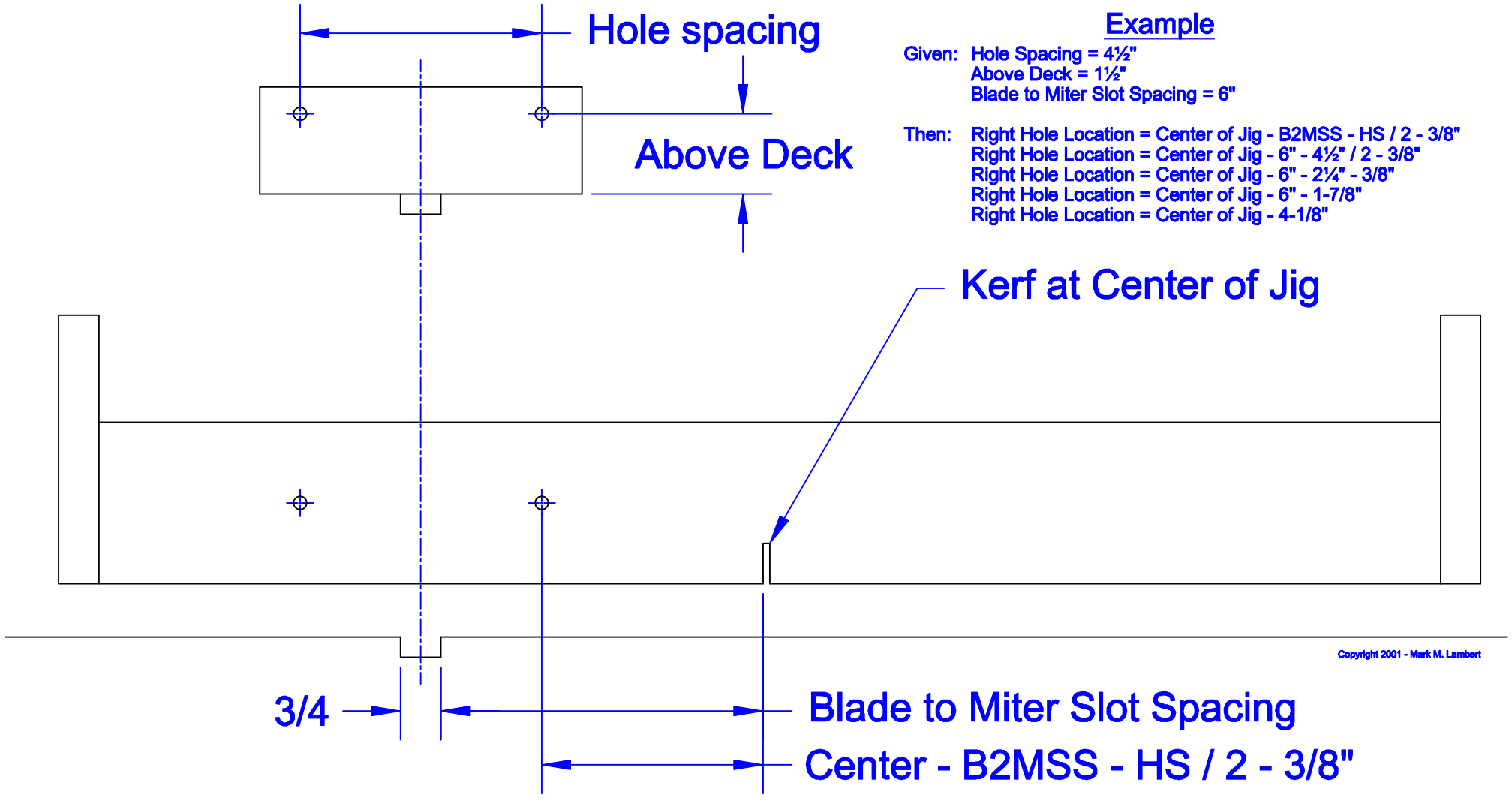
One tip. After you've cut a panel, the carriage is at the left end of travel and having to "unwind" the crank is a PITA. What I've done with great success is to attach my drill on the free end of the shaft and power spin it back to the original position.

You don't normally clamp the stock to the jig. Typically you cut and then flip the stock to cut the matching joint on the other end. Clamping and unclamping would be impractical. I just keep hand pressure into the corner of the carriage and cut. Since you're pressing into the blade, the blade presses it even tighter into the carriage and everything works well. After I've completed a

cut I generally don't pull the stock back thru the blade. I lift the stock free, pull the jig back and then reload the jig with the other end of the same piece or the next block.

When you cut a box, you have two sides and two ends. Tape the ends together as a single item, same with the sides. Then you can be assured that your pieces will match exactly as they are cut as a set. You make the same cut on both sets of pieces and then adjust. This minimizes the number of times you adjust. If you're cutting both ends you wind up making four passes between adjustments, two for both ends of the sides and two for both ends of the ends. I know this sounds complex but when you start doing the cuts it'll make perfect sense. I extended the side of the carriage so that you can cut multiple sets. You should be able to cut all the pieces to make two boxes at a time. This doesn't take any longer than cutting one box once you're set up.

Drilling Miter Gauge Mounting Holes



Example

Given: Hole Spacing = 4½"
Above Deck = 1½"
Blade to Miter Slot Spacing = 6"

Then: Right Hole Location = Center of Jig - B2MSS - HS / 2 - 3/8"
Right Hole Location = Center of Jig - 6" - 4½" / 2 - 3/8"
Right Hole Location = Center of Jig - 6" - 2¼" - 3/8"
Right Hole Location = Center of Jig - 6" - 1-7/8"
Right Hole Location = Center of Jig - 4-1/8"