

HOW TO MAKE A BOX JOINT

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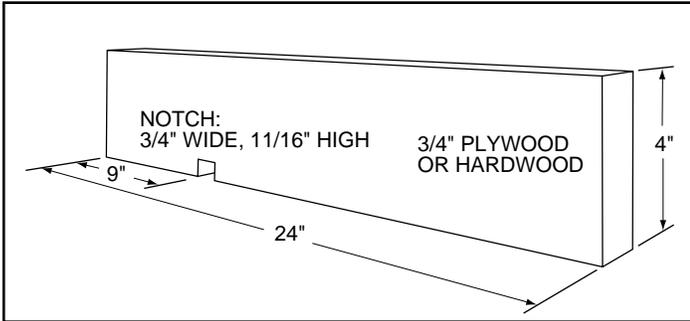


FIGURE 1

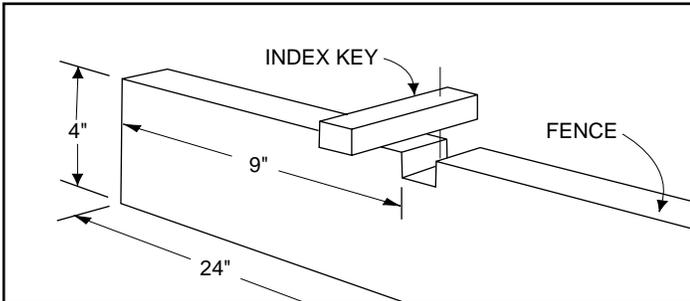


FIGURE 2

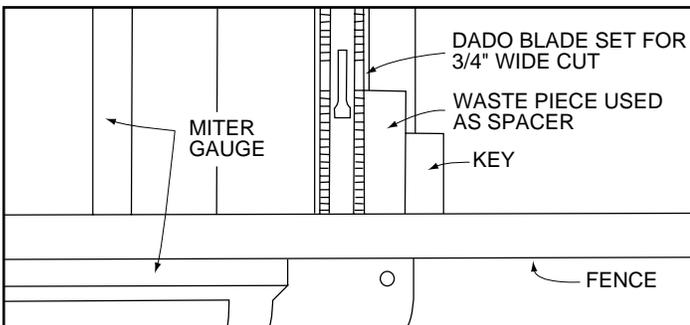


FIGURE 3

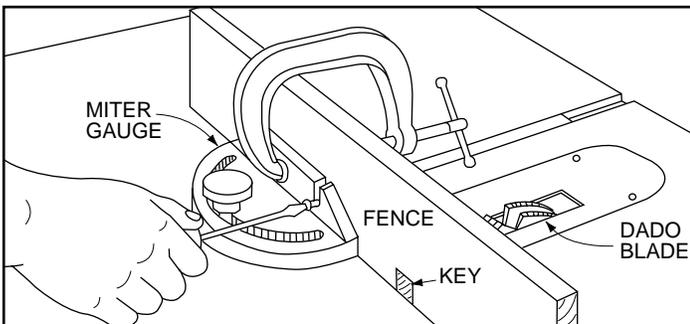


FIGURE 4

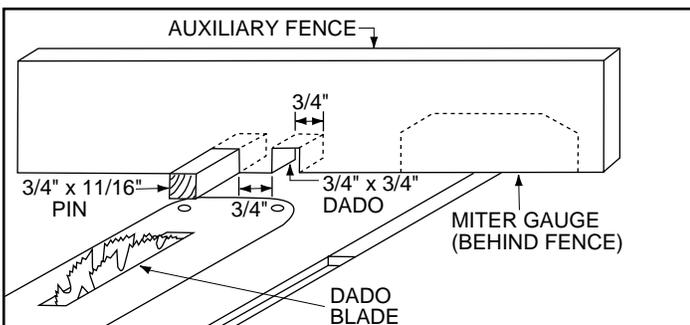


FIGURE 5

Box joints ought to get more praise than they do. Once this joint is cut (if it's cut well) it takes only a little glue to make an extremely strong joint. That makes it particularly nice for beehive boxes. Box joints are extremely flexible as far as size (or scale) is concerned. They can easily be cut to "look right" on 4/4 stock, or reduced down to a scale that's appropriate for stock as thin as 1/4".

It's quite easy to cut a box joint on a table saw (if you have the patience to set up the cutting jig). There are three basic requirements for cutting a box joint: 1) a simple, but accurately aligned jig or cutting fence, 2) a miter gauge designed to hold the fence, and 3) a good dado blade.

The fence (or jig) for cutting a box joint couldn't be simpler. It's basically just a piece of 3/4" plywood (or oak as I used), as shown in Fig. 1. The important thing is you need a miter gauge that will accept this fence. Most miter gauges have holes for attaching jigs of this type. If your miter gauge doesn't have these holes, you'll have to bore two 1/4" holes so the fence can be attached.

The third requirement mentioned above is a good dado blade. I think the best dado blade available is a blade set which consists of two outer blades with an assortment of different sized chippers that get sandwiched between. It will give you flat bottoms on the cut and you will always have the exact same width from changing blades back and forth. Another blade that will get the job done nicely at a third of the cost of a blade set is a single-blade adjustable dado. The one disadvantage is that the bottom of the cut is slightly concave (rounded) or convex on the wider cuts depending on which brand you buy. Freud makes excellent saw blades and offer carbide tip blades in both styles. Stay away from non-carbide tip blades if you plan to make more than just a few boxes. The steel won't hold it's edge for very long.

Before cutting the joint (and before making the cutting fence), some thought must be given to the final appearance of the joint. The joints used in making the beehive are the most basic approach to cutting the box joint. In this case, the wood is 3/4" thick, and each 'pin' and 'slot' is 3/4" x 3/4". The width of workpieces used with a box joint must be considered ahead of time. The ideal situation is a workpiece that's an odd multiple of the height of each pin, plus a little extra for trimming to the exact size. In other words, if a 3/4" x 3/4" box joint is going to be cut, the width of the workpiece should be 3 times, 5 times, 7 times 3/4", plus a little extra.

This odd multiple will yield a joint with a pin at the very top and very bottom of the joint. If it's an even multiple, there will be a pin on top and a slot on the bottom, and the joint will look unbalanced. The 'little extra' mentioned above allows for some flexibility when cutting the joint. For example, when making a joint for a medium hive body/super, if each cut is off just 1/64", the cumulative result is over 1/4" off by the time you get to the last cut. By leaving this little extra width, you can alter the last cut to compensate for this fractional cut.

The crucial thing here is making the cutting fence. If it's cut and mounted properly, everything else just falls into place. I used 3/4" oak of the dimensions shown in Fig.1 to make this fence but 3/4" plywood will work very well also. First I set the width of the dado blade to the width of the pin I need. (The drawings show the dimensions for cutting 3/4" x 3/4" pins which are used for the hive bodies and supers.)

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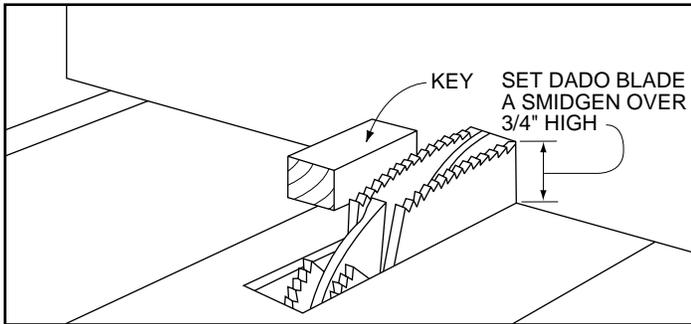


FIGURE 6

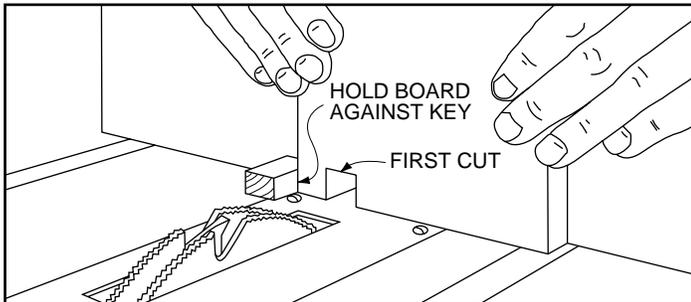


FIGURE 7

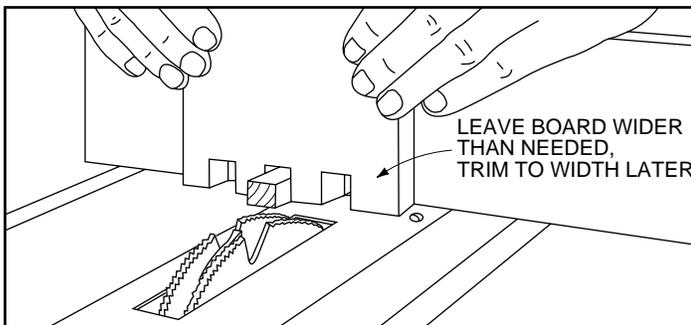


FIGURE 8

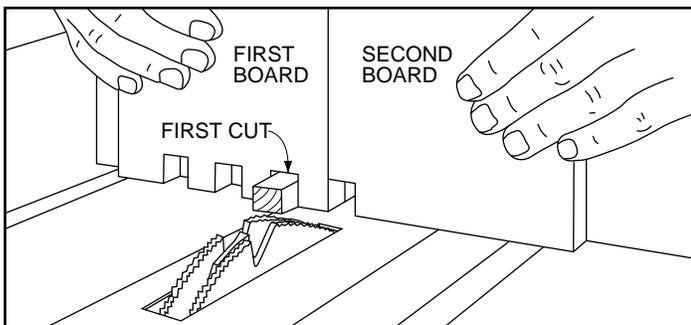


FIGURE 9

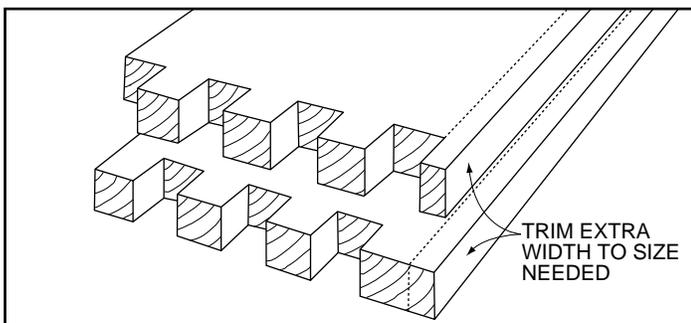


FIGURE 10

The first cut (for the key) is made about 9" from the right end of the fence. This notch has to be exactly as wide as the box joints. In this case, exactly 3/4" wide. It's best if this cut is not a full 3/4" in depth but rather about 11/16" so that the box joint slot fits over it with a little room to spare when the joints are cut, refer to Fig. 6. Now a hardwood key (index pin) is cut to fit this first notch. (Cut a piece longer than needed (4" total) so a section can be used later as a spacer.) Accuracy here is essential. The key must be exactly as wide as the notch. It may take several attempts to get it right, but this will save many headaches later. The key need only be about 1-1/2" long. Now glue the key into the notch.

Line up the cutting fence as shown in Fig. 2, using the waste section of the key. Then clamp the fence to the miter gauge, and mark the position of the pilot holes for the screws. Remove the fence and drill the pilot holes and fasten it to the miter gauge with screws, Fig. 3. To align the fence, make a trial cut, just barely nicking the bottom edge of the fence. Now, carefully check the spacing. The space between the key and the 'cut hole' should be exactly the same as: 1) the width of the key, and 2) the width of the 'cut hole.' If not, make a small adjustment until it's right on. If you're working with 3/4" wood, adjust the height of the blade so it's just a smidgen over 3/4" high. This will make the pins slightly longer than needed so they stick out from the surface of the mating board.

Why would you want to do that? Doesn't it just create more work to sand the ends of the pins flush with the side of the box? Yes, but sometimes when cutting the joints, the cuts are off just enough so the pins are too short. I think it's better to cut slightly longer pins and sand them down. Before cutting the joint, it's also helpful to score the back side of the workpiece (the side that will be against the fence) with a knife. This score line will prevent chip out on the back side of the cut. If your dado blade cuts without any chipping, then you may want to skip this extra step.

On more thing before you start your cut. Again, it's best to cut the workpiece a little wider than what's needed for the finished width. This allows some flexibility for setting up the joint. It's best to cut the boards to rough width, 1/4" to 1/2" wider than needed. Then trim the boards to the final width according to the final layout of the joints. Now you're ready to cut the joint.

Position one board up against the pin (Fig. 5) to make the first cut. This board will, of course, have a full pin on the top edge (it's usually the front piece on a drawer and has to be the front piece of the hive box). Make the first cut and then lift the board and place the notch you just cut over the key. Then make all succeeding cuts the same way (Fig. 6), leaving the last pin a little wide, as shown.

The first cut on the second board will be a notch. This notch must mate precisely with the top pin on the first board. I've found the best way to align this cut is to use the first pin in the first board. Simply flip the first board around so the first pin is between the key and the second board. Push the second board up tight and make the cut, Fig. 7. This should yield a perfectly matched notch for the pin. After cutting this notch, slide it over the pin and continue to cut notches across the width of the board to complete the joint. Finally, trim both boards to width, and you should have a perfectly matched box joint.