

# Box Bits #6 Mitre Keys



Box by Andrew from AWC

## Introduction

Mitre Keys are a necessary strengthening method for mitred box corners, as well as being an aesthetic addition to the overall box presentation. The extra strength is required due to the small endgrain gluing surface provided by mitred corners and the increased strength comes from the extra glue surface provided by the mitre keys and the slots cut into the carcass and lid to fit them, combined with the fact that the grain of the key stock runs at an angle across the mitre joint. Usually mitre keys are made from a stock that is of a contrasting colour to the area of the box they are fitted into thereby adding to the box presentation.

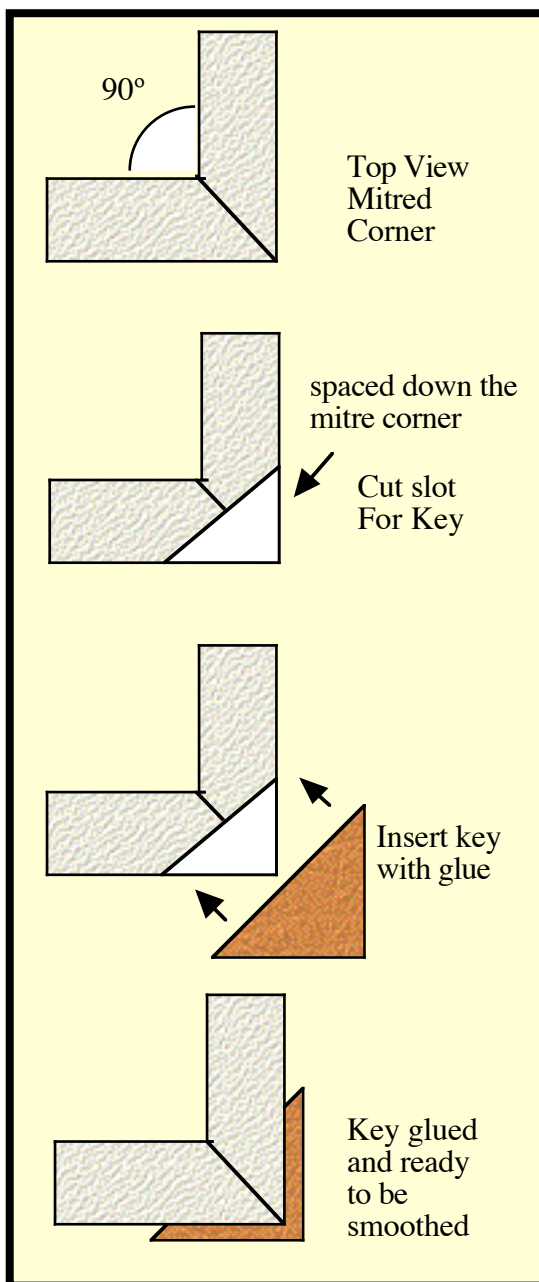


Figure 1

Figure 1 shows the basic steps in the making of a Mitre Keyed joint for a box with 90° mitred corners. Boxes with angled corners other than 90° may also utilise Mitre keys and the principle remains the same.

The slots for the key may be cut using many methods which include Hand Saw, Band Saw, Table saw, Router and even a Scroll Saw. Each method has its own merits and problems, however, in this article a Table Saw will be used as the preferred method for cutting the slots.

The key slots are spaced according to the box maker's taste or needs, but a slot at each corner of the lid area is highly recommended due to the relatively small mitre area of the lid.

The basic criteria for the slot is that no matter where the box maker places them, each slot must have a flat bottom. This ensures that the mitre key can match the profile of the slot without showing any gaps in the finished box faces.

The keys are cut at a thickness to fit the slots snugly and may be produced as triangle shapes for waste economy or as rectangular lengths that can be cut and smoothed after gluing.

After a test fitting the keys are pasted with glue and inserted into the slots firmly, ensuring that the long key edge sits completely against the flat base of the slot.

When the glue is set and dry, the excess edges of the key are removed and sanded down until the outer edges of the key are even with the box side faces.

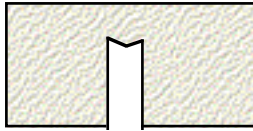


Figure 2

As mentioned previously, the bottoms of the slots cut for the mitre keys should be flat on the bottom, which when using a Table Saw is actually the top of a saw cut. These cuts by a normal Table Saw blade will cut a slot as shown in Figure 2 due to the alternate set of the teeth..A key inserted in such a slot will not fit correctly and show the unevenness of the slot bottom in the finished product.

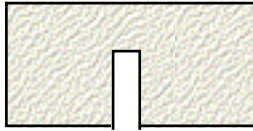


Figure 3

The correct slot is shown in Figure 3 and is made with a Combination Table Saw blade, which as well as having an alternate set on the teeth, has a flat tooth every 3rd or 5th tooth which flattens the slot profile. This will allow the inserted mitre key to fit the slot profile perfectly . An aluminium cutting Table Saw blade will also produce this flat profile.

Now, to make multiple accurate cuts in all corners of a box, on a Table Saw, you need a jig. Within the forums there are many Mitre Key jigs described, and on the Internet there are literally hundreds of plans available, consequently we will just give a basic plan with approximate dimensions and lean towards actually using a jig.

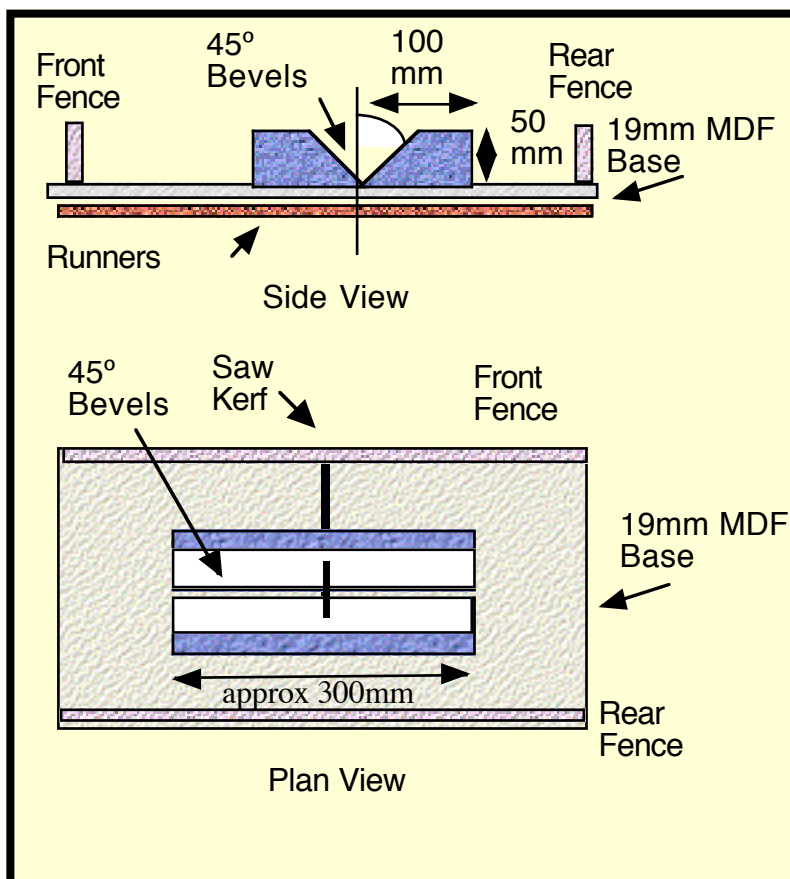


Figure 4

Figure 4 shows a Plan View and Side Elevation of a typical Mitre Key sled used for cutting the key slots in a box carcass . This jig utilises the Mitre Guide slots of the Table Saw to carry the box forward across the saw blade.

The box is held perpendicular to the saw blade by two bevelled 100mm x 50mm cleats which are mounted on a 19mm MDF base. When mounting these cleats care should be taken that they are mounted at 90° to the saw blade kerf cut into the MDF base.

The Front and Rear fences provide stability to the MDF base.

A moveable stop block should be mounted on the rear cleat to ensure that the slots in each corner of the box are spaced as planned.

For boxes with corners cut at other than 90° a separate pair of cleats with the appropriate bevel will be required.

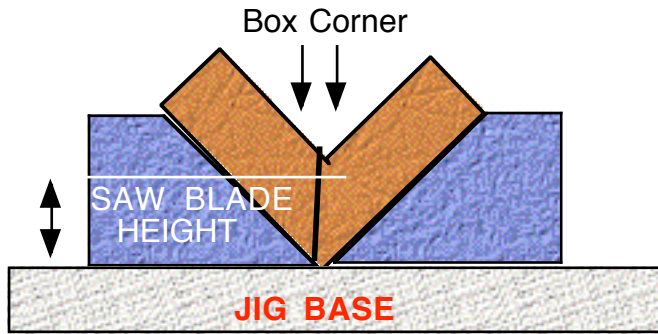


Figure 5.

### Blade Height

Once the jig runners are running smoothly across the Table Saw, raise the saw blade until it is approx 25mm above the top of the jig base and take a cut through the two bevelled cleats. Now place the box into the jig to one side of the saw blade and adjust the blade height until it is approximately 3mm below the inside of the box corner as indicated in Figure 5.

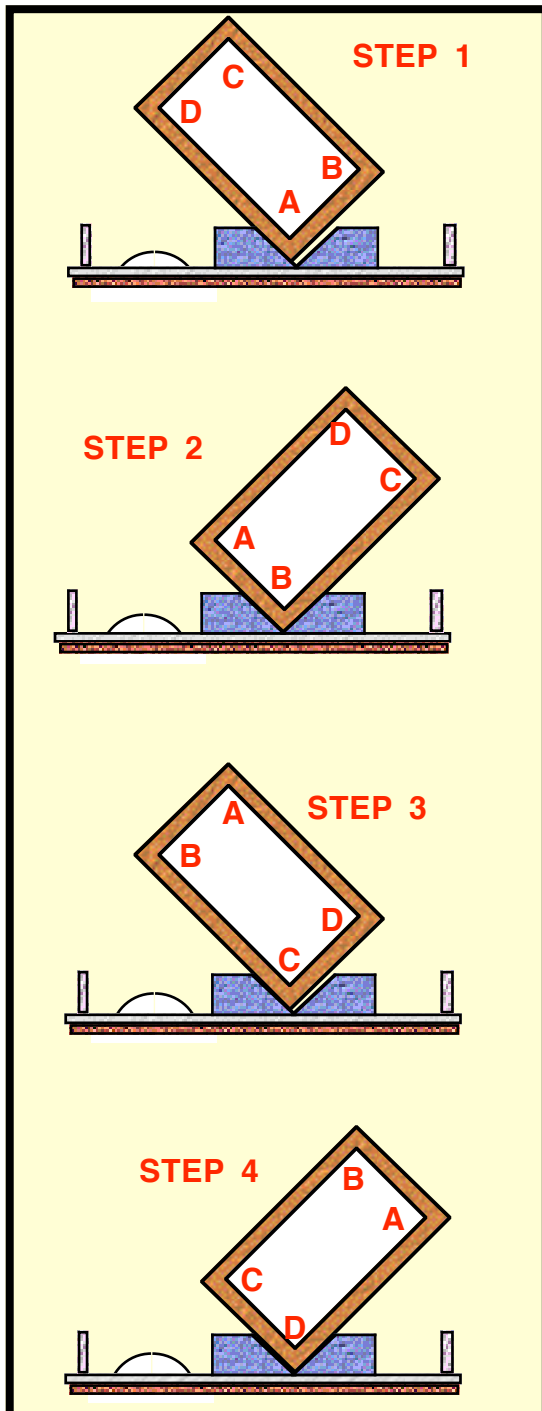


Figure 6

Well now its crunch time. You're ready to cut slots into this box that you've spent a fair amount of effort and time to get to this stage, So, a bit of planning, layout, thinking, and more thinking will not go astray at this point. Things like:

- . How many slots at each corner.
- . What is the depth of the lid.
- . Will the lid slot be central in the lid area.
- . Are the slots to be evenly spaced.

Once all these points have been settled, then its time to proceed.

### Slot Cutting Sequence

Adjust the stop block to the required placement for the first set of slots and run a scrap piece through the saw against the stop block to check all is OK. Put this bit of scrap aside, and mark it with the particulars of the saw blade used to make the cut.

Now place the box in the jig with either the top or the bottom against the stop block (your choice due to the planning session above) and commence cutting the slot at corner A as at Figure 6 - Step 1.

Rotate the box toward you, in the same plane with respect to the stop block and place it against the stop block and cut slot B. Step 2 - Figure 6.

Again rotate the box toward you and proceed to cut slot C Step 3 - Figure 6.

Now rotate the box toward you and cut slot D as in Step 4 - Figure 6

For the number of slots planned above, reset the stop block as required and continue cutting slots by repeating Steps 1- 4 for each new stop block position. For equally spaced top and bottom slots, reversing the position of the box with respect to the stop block is an option.

Now its time to make the keys, and as mentioned previously, they may be either rectangular or triangular as shown below in Figure 7.

The things we have discussed about the keys so far:

- Most often made of a stock with a contrasting colour to the rest of the box.
- Sized so that there is excess to be removed after glue set
- The grain direction is across the mitre joint
- They are an accurate snug fit into the slot.

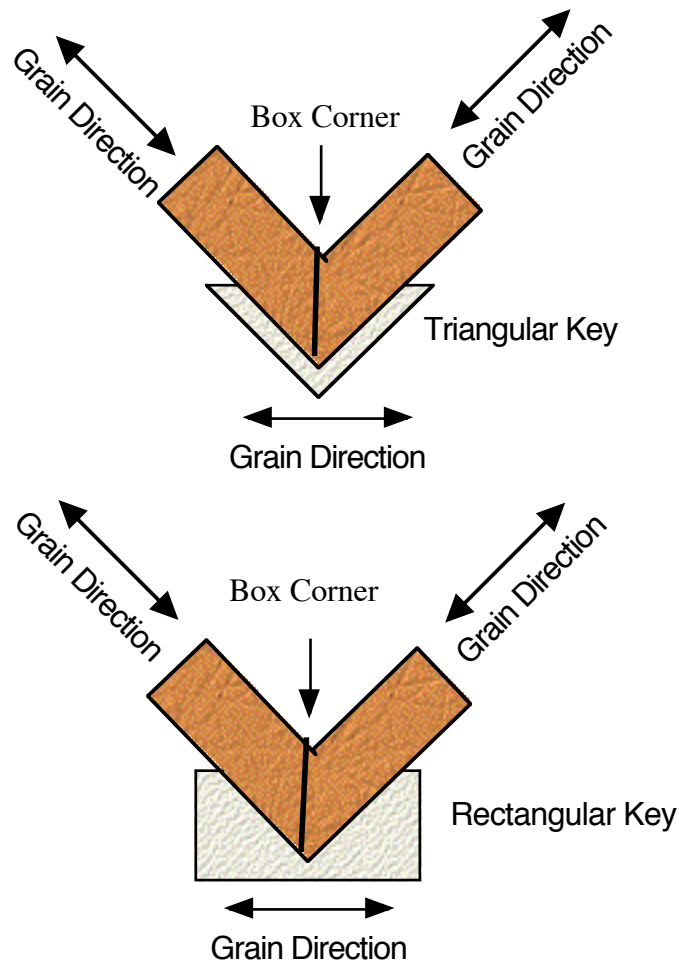


Figure 7

The easiest way to cut these strips is to use the table saw and there are many downloadable articles with methods and jigs to do this.

However, before you attempt any thin strip cutting, do yourself a favour and fit a Zero Clearance Insert into your saw, as thin strips have a nasty habit of becoming very fast moving thin spears when the stock binds or gets caught by the saw blade. That's a ZERO CLEARANCE INSERT.

Quite a number of the articles available also advocate the resetting of the Table Saw Fence for each cut and moving the stock against a fixed stop that is set at the strip thickness away from the Saw Blade. This is a bit tedious and can result in slight variations in strip thickness.

Here we have detailed a simple jig that requires a one-time fence setting, prevents kick-back of the cut strip and provides accurately cut strips of the required thickness.

The jig starts life as a 150mm wide x 19mm thick plank ( Tassie Oak is ideal) which is cut to fit your Table Saw table as shown in Figure 8. The two cleats (D) are fixed to part C so that C is a snug fit over your Table Saw table thereby preventing C from moving forward or backward during strip cutting.

Parts A and B are laminated one on top of each other to become a sliding push block that has the addition of a handle to keep your fingers well out of the way of the Saw Blade. A sacrificial block of scrap ( E ) is mounted onto the push block with E being thicker than the strip thickness plus the saw blade plus a bit, and long enough that the Push Block runs smoothly along C without binding on the saw table.

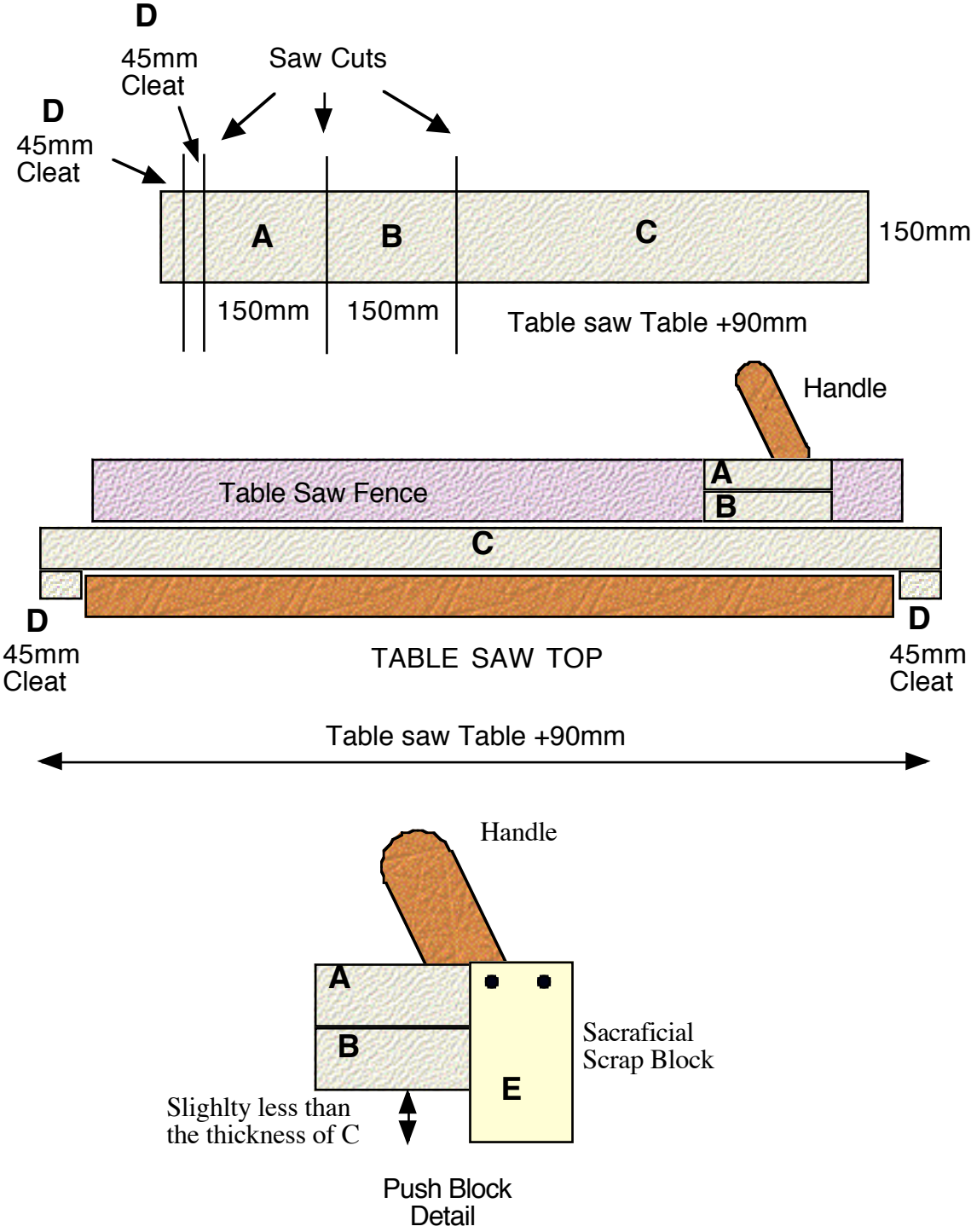


Figure 8



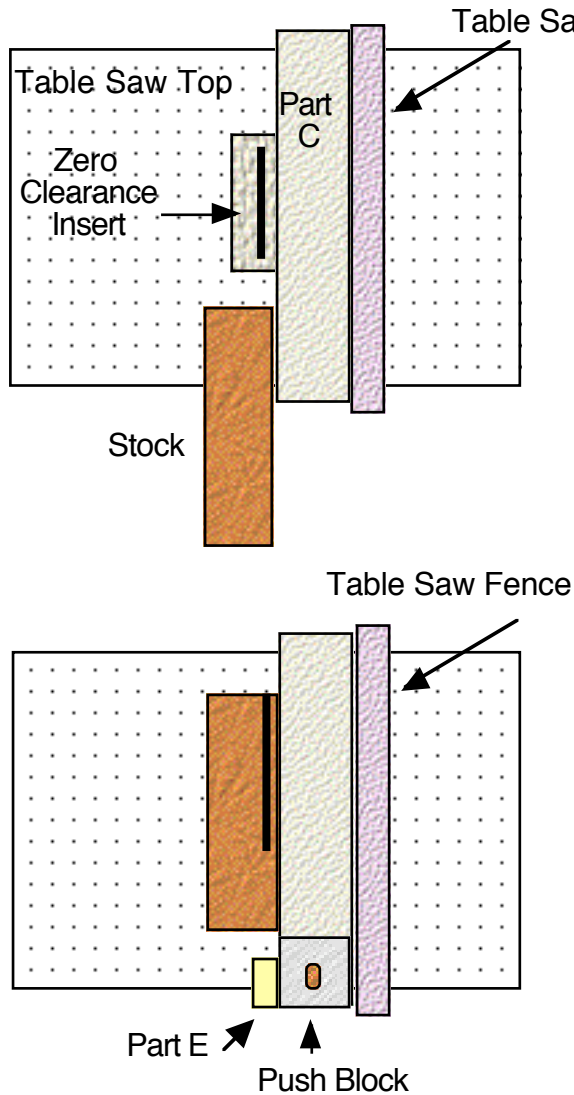


Figure 9

Figure 9 is a bird's eye view of the jig in use. Now, remember back on Page 3 where we said "Put this bit of scrap aside, and mark it with the particulars of the saw blade used to make the cut"

Well, now is the time to use it. Its called The Test Slot.

The jig is set as follows:

Place Part C to the right of the Table Saw blade, and adjust it and the Table Saw Fence until the gap between Part C and the blade are approximately the width of the cut in the Test Slot.

Run some scrap into the blade using the blade side of Part C as the fence, and once the rear end of the stock is past the rear edge of part C, use the push block, running on top of Part C and against the Table Saw Fence, to take the scrap stock completely past the far end of the Table Saw blade. The blade will cut a slot into Part E, but this sacrificial block will do many cuts before it needs to be replaced.

Test fit the scrap strip into the Test Slot and adjust the Fence and Part C until a snug fit is achieved into the Test Slot with subsequent strips cut from the scrap. Once satisfied with the fit, commence cutting strips from your chosen Key Stock.

Points to Note:

Keep the stock firmly against Part C which will ensure accurate strip thickness.

Make sure the Push Block takes each strip completely past the rear of the Saw Blade, this will ensure that there are no "flying spears"

Keep your fingers out of the way!

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Now your strips are cut, separate them into the appropriate size so that there is some excess on each key when mounted into the mitre slot already cut into the box carcass. As mentioned previously, you may cut them triangular or rectangular.

I remove most of the excess of the mitre keys after glue set with a single bevelled Japanese style saw, and then smooth the box sides and the keys on a stationary belt sander. The method is up to you.

So there's a "How and Why" on Mitre Keys.

Have Fun!