

Lock Miter Bit Set-Up

Introduction

The Summer 2009 issue of the *Journal* contained an article on using the lock miter router bit. It stated that the bit height and fence setting are inseparably related, and moving one requires compensating movement of the other. However, there is good news. One *can* independently set the bit height and fence position, and can accomplish the complete setup with a single test cut. And no set-up block is required. To accomplish this one needs tools capable of a machinist's precision. The minimum are a digital caliper and a router with a fine bit height adjustment. Even better is a router lift for your table.

To understand the set-up steps, we need to understand the geometry of the lock miter bit as shown in Figure 1. For the joint to mate correctly, the center line of the bit must align with the midline of the stock thickness. In addition, the fence must be set back from the location of the cutter edge at the table surface by the stock thickness. An acceptable joint will only tolerate misalignment on the order of thousandths of an inch.

Stock Control

The lock miter bit must make the complete cut in one pass. With the cutter blade at a 45° angle to the table and fence, there is a tendency for the workpiece to be pushed up and away from the bit. In addition, after passing the bit there is very little stock remaining to bear on the outfeed fence or table. To safely compensate for this, one should construct a special push tool to maintain the stock under firm control. Don't even think about not making one.

An example of this push tool is shown in Figure 2. The six inch shoe must have a solid handle for gripping, and the sole is covered with 120 grit sandpaper. The heel matches the workpiece thickness and is attached to the base with double-sided tape to allow easy changing for different thickness. Its length matches the width of the shoe to prevent tearout. Its use is illustrated in Figure 6. When working with plywood panels, the push tool is replaced by a featherboard to keep the panel surface in position against the table or fence as shown in Figure 3..

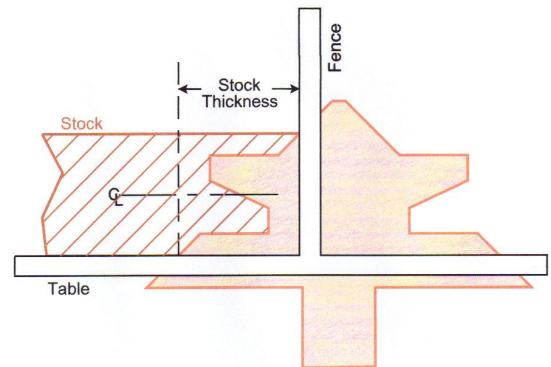


Figure 1 – Lock Miter Geometry



Figure 2 – Push Tool

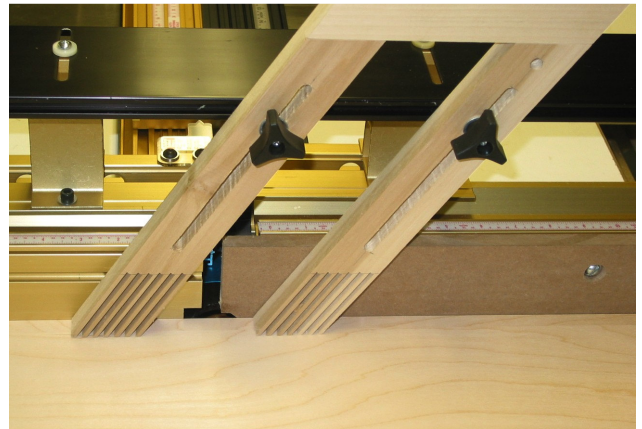
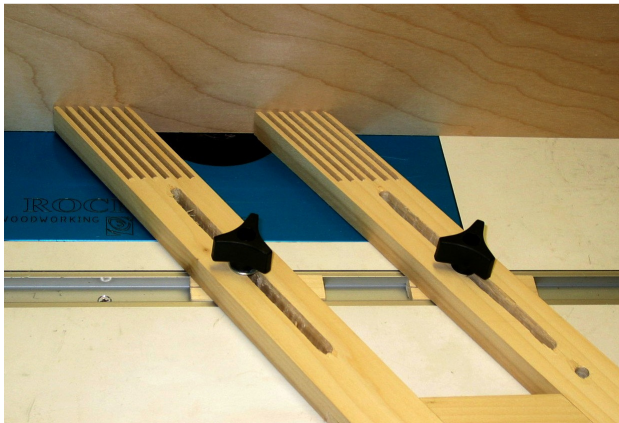


Figure 3 – Featherboards for Safe Panel Control

Bit Set-Up

The first step is to prepare your stock to its finished thickness, and to mill two extra pieces for testing. If building a small box, two matching side pieces can be cut a couple of inches long for the test cuts and trimmed to size after the bit is set up.

Next adjust the height of the bit so the center line is approximately at the midline of the stock and set the fence back from the cutter edge by approximately the stock thickness. Mark one test piece UP and run both through the router. Mate the two pieces on a flat surface as shown in Figure 4. There will be a small step at the joint surface which is equal to the distance between the respective center lines. If the UP piece is higher, the bit needs to be raised; if lower, the bit needs to be lowered. Use a digital caliper to measure the step height, divide it by two and adjust the bit height by this amount. Your router table or fine router depth adjustment will probably be calibrated in fractions of a 64th of an inch (0.016"), while the caliper measures in decimal inches. Four divisions per 64th are four thousandths of an inch each; 8 divisions per 64th are two thousandths each. With the bit now set at the correct height, trim off the joint ends and run them through the router again. They should now match perfectly.



Figure 4 – Bit Height Measurement

With the bit now at the correct height, adjust the fence distance as follows. Turn the bit so that the cutter is at 90° to the fence. Place a piece of stock on either side of the bit to establish the distance. With a straightedge against the stock, position the fence so the straightedge just touches the cutter as shown in Figure 5. Run a test piece through the router vertically as shown in Figure 6. When joined to a horizontal piece, a perfect locked miter should result as shown in Figure 7. This completes the adjustment of the lock miter router bit.

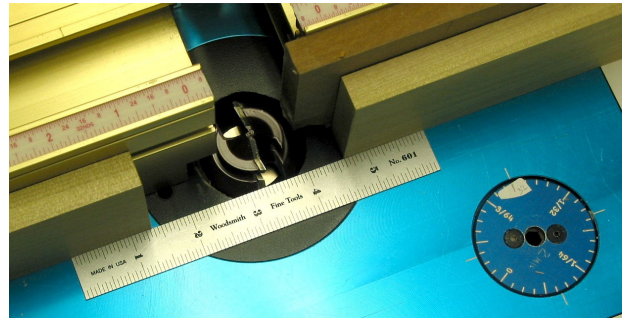


Figure 5 – Fence Adjustment

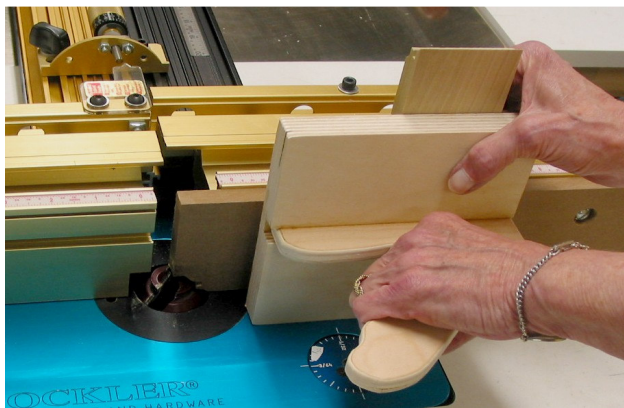


Figure 6 – Routing Vertical Piece

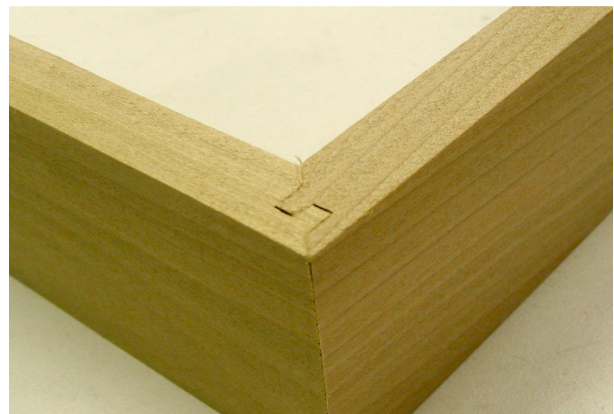


Figure 7 – Finished Joint

Besides making miter joints, the lock miter bit has several other applications. It can be used to make a locking joint for gluing boards both lengthwise and endwise. It can also be used to attach hardwood strips to hide plywood endgrain on carcasses, add stiffening strips to plywood bookshelves, and eliminate the end grain when joining plywood panels at 90°.