Mortising and Tenoning Jigs

Mortising Jig

The Mortising Jig is made of 3/4" thick MDF (Medium Density Fiberboard). Make it as accurately as you can. The central core is a lamination of 3 thicknesses of MDF. The core area must be made perfectly straight and square. The sides are edge banded, the edge banding flushed off, those edges are jointed and the two sides are ripped to width. The sides are Lamelloed (using biscuits) to align them to the core. Kerfs 1/16" deep are cut into each side of the core near the top edge to allow for glue squeeze out. Make sure that the sides are square to the core and that their top edges are parallel to each other and to the core itself.

The piece to be mortised is held in the jig by multiple go-bars, which are 3/16 x 3/4" sticks that are just shorter than the distance between the jig sides and the workpiece. Take up the small gap with masking tape so the go bar holds the workpiece tightly with a bit of masking tape squish.

The work is held in the jig and the location of stops for the mortise is determined using story sticks, which are dedicated wooden rulers. There is a story stick for the front and back of the router, extending from the router base to the diameter of the given cutter for the front and back of the router base. These sticks reference from the layout lines of the mortise on your workpiece and show where the stop blocks are clamped to the jig.

You use a router fence **(or two, sandwiching the jig between the fences: *This is best and safest!)*** with this jig and set the distance of the fence so that it places the cut between your marking gauge cheek lines. The mortise depth is set using the depth stops on your ***Plunge Router.*** It may be necessary to shim the workpiece up in the trough of your jig: I make several plywood strips of varying thickness so I can change the depth of the jig's trough.

The cut itself is taken 1/32" or so at a time. If the fence is on the left of the jig as you face the end (of the jig), the cut is done moving the router towards you. *Moving in this direction causes the climb of the cutter to pull the router fence tight to the side of the jig.*

On Cutters:

I use two flute upcut machinist end mills made of high speed steel. Typically they come with 1/4", 3/8" and 1/2" shanks. Your router comes with 1/4" AND 1/2" collets, and you can order a 3/8" collet for most routers. Cutters larger than 1/2" diameter can be obtained with reduced shanks (1/2"). What I mean by upcut is if the mill is in a router with the motor above, or in a Bridgeport ditto, the flutes angle and spiral away from the rotation direction. The chips are lifted up and out of the cut. This is like a hand plane where the cutter is angled back away from the direction of the cut. Downcut to me means that the cutting angle is acute to the cutting direction and the flutes spiral forward. This is more of a scraping motion and won't work (extract chips) very well in a deep hole. This is more of a surfacing cut where the chips are thrown to the side. It is more like a card scraper or # 80. The four flute mills don't clear wood chips as well. You get mortise walls that have chip burnishes like planed boards do when the dust

collector isn't working properly. The chips are carried around in the cut and are crushed into the wood by the cutting edge.

You want the longest bit that will fit in your plunge router and not hang below the base when the plunge mechanism is fully retracted. Maximum bit length is: How far from the collet nut to the base of the router + depth of the collet, - 1/8".

Source: Go to http://www.endmill.com/ Scroll down that page to:
COMPLETE TOOL CATALOG Download the 3.3 mb - Adobe PDF
Go to page 65.

Tenoning Jig

This rides over the rip fence in an inverted U in end view. The rip fence must first be made parallel to the miter gauge slot in the tablesaw surface. You remove the 1/32" of toe out typically set for safety on most saws.
If YOU REMOVE THE TOE OUT ON THE SAW, YOU MUST RESET IT AFTER THE TENONING OPERATION IS COMPLETE. HAVE THE INSTRUCTOR CHECK IT BEFORE YOU LEAVE AND BEFORE ANYONE ELSE USES THE SAW.

The jig is not glued together. The central block that bridges the top of the fence is made slightly thinner than the thickness of the saw fence. Use a clear stable wood (mahogany) for this block and use MDF for the faces of the jig. The fit to the fence is made movably tight using paper shims. The jig is held together by screws. The handle that you use to push the jig is the same thickness as the part to be tenoned. The screws in the handle are always placed higher than the maximum anticipated blade height so you don't damage the saw blade by cutting into them. Use a De-Sta-Co clamp to hold the work in the jig. See Tools: Clamps Handout for source. Many rip fences are not dead square to the saw table. The saw blade is therefore made parallel to the face of the jig by feeling for parallel with a paper feeler against a picked tooth and tilting the blade (perhaps off square to the table) until the two are parallel. Tenons are cut with the reference face against the jig face. One cheek is cut first on one setting and then the second is cut to fit. Use a bandsaw to cut the cheek waste off to check fits into your mortise.

Tenon shoulders are cut using the miter gauge or the sled. The saw fence is used as a length stop, ***which is safe if the cheek waste is cut off first on the bandsaw***. Bandsaw the cheek waste shoulder cut well shy (1/16" minimum) of the scribe line and then do the accurate cut with the miter gauge/ saw fence setup. The blade height is just shy (.005") of the cheek face itself.

***Revised* 2/21/2006**