

CMT

ORANGE TOOLS[®]

CMT 45° Lock Miter Bit



**Using CMT's 45° Lock Miter Bit
to give the profile to the base for
the small clock cases**

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So here I was looking at some small clocks in a gift shop nearby, and this young lady notices me measuring one wood item and she asked: “What are you going to do, make one?” “No,” I said, “ I think I will make 10 or so.”

At the end of the conversation she had agreed to be on the website if she could be my student – she is a craft person but doesn’t have woodworking skills.

So meet Beth – new student of “WoodShopDemos-U.”



While the box at the shop was nice, I wanted to do several things that would add some nice “woodworker” touches. One such thing, was that I wanted to use locking miter corners. They certainly help structurally, but will also look nice – if we can do them well. Small pieces of wood can be a challenge to shape safely.



Based on the size of clock face in the store, I ordered 10 clock sets and 20 picture frames to match. My concept was to have a center clock box with two panels hinged to the sides.

I suggested to Beth that she start to layout the sizes, based on the clock face sizes.



She thought I was kidding, at first, when I said to just start sketching on the workbench top. I have matte white Formica on all the surfaces just for this reason – so she started sketching.



As she sketches a possible plan, I cut a piece of cherry that I have ripped to 1/2" width. We are just trying to get a sense of proportions at this point.



Well, we are getting somewhere. Here is what we are deciding: 1) have 1/2" margin around the clock face; 2) the width of the case will be 4" then; 3) 5" seems to be a nice, well proportioned height; and 4) this 4" X 5" box will set on a base that will raise it another 1/2". So that is our plan. We will set out to make boxes of this proportion.



By the way, I ordered the 10 clock pieces and 20 frames from www.clockparts.com, a site recommended by an "on-line" friend. I was very impressed that they arrived on time, packed very well in bubble wrap pockets and all the clocks had batteries installed and were working. What more could I ask for? One clock and two picture frames cost just under \$10 a set in the 10/20 quantity – about \$2.50 more in single quantity.



[The items I used are: WA810WA 2" Quartz Clock Fitup and WA810PF for matching picture frame.]

It is time to cut the slab of cherry that I have in mind for the box sides. It is about 2 1/2" thick. I have had it on hand for years, so this is a good time to use it and to try some repetitive resawing on the SuperStation.

Beth starts by placing the cherry just touching the blade and then moving the fence so that it just touches the cherry. She locks the fence in this position. It is time to cut the slab of cherry that I have in mind for the box sides. It is about 2 1/2" thick. I have had it on hand for years, so this is a good time to use it and to try some repetitive resawing on the SuperStation.

Beth starts by placing the cherry just touching the blade and then moving the fence so that it just touches the cherry. She locks the fence in this position.



With the fence touching the cherry slab and locked, she moves the template for 5/8" spacing. This will give a 1/2" width board after the 1/8" kerf of the blade.

Then, with some further sanding, the final width of each piece should be about 7/16" – which will work very well.



Pardon the grainy close-up, but I wanted to show you the template. The blue numbers are the marks for the 5/8" spacing and the red are for the 11/16" spacings. The Inkra System provides a series of these uniform spacing templates in addition to the many dovetail, box joints and specialty templates.

Beth has lined up the tape so that one of the blue marks (16) is directly under the cursor. It doesn't matter which blue number is used.



With the wood resting on a roller stand, setup for help at the infeed, Beth places a featherboard so that it applies slight pressure on the board just before the blade.



Before you jot an email off to me, I will apologize for the Exaktor Overarm Guard not being in use. We have swung it out of the way so that you can see what is happening.

Do note that the splitter is in place and that Beth is standing to the side and is wearing eye and hearing protection.

A CMT 24-tooth, anti-kickback design, rip blade is installed. It makes smooth cutting of this heavy plank.



A few minutes later and Beth has the 5 strips we need for the clock cases. Keep in mind, that she moved the fence after each cut, using the blue 5/8" marks on the Incra TS-III template.

The alternative would have been to set the fence at 1/2" – not a rip cut that I would recommend for a beginner, or anyone. This is clearly the better way, and the results are extremely uniform. You can't ask for more than that.



I cannot tell a lie – I had to retouch the background – the adjoining room was such a mess.

This picture motivated Sal and me to clean the room. We also needed it clean so we could finish the bar.

Beth runs the cherry strips through the thickness sander with 150 grit paper installed. It takes about 15 consecutive passes to bring the boards down to the 7/16" we were looking for.



Just a few more passes. The CMT blade left very few saw marks. When I first said that "now we get to sand them all", Beth thought it was sandpaper and manual sanding time. She really liked running the pieces through the thickness sander.



With the saw unplugged, Beth changes to the CMT 40-tooth, "General" blade. It is not thin kerf. While I enjoy using some of the thin kerf blades, I think the standard blade allows less flexing during cross cutting. I do use a single stabilizer on all blades.



I have to admit that for many years, I did not unplug the table saw when changing blades . Then it dawned on me that it was important to do so, and that if I hung the cord over the hook that holds the wrench, I could unplug and re-plug in the same bending operation. It is the safer way of doing things.



Beth is now marking the approximate lengths for each box. Each ripped piece will give two boxes and about 6 inches of waste. She now is looking for the best grain pattern and for defects that she wants to avoid.



Since we want the grain to “wrap” around the box, Beth marks slant lines, or witness marks, so that the pieces can be re-oriented correctly after they are shaped.



This close-up may give a better view. The four blocks are those cut for the prototype and are used here to aid in the positioning of the white orientation lines.



A reader asked a few days ago, “are you ever going to use the Inca Miter Gauge, now that you have the sliding table?” I said, check the site this coming week.

It is the ideal tool for cross cutting small parts.



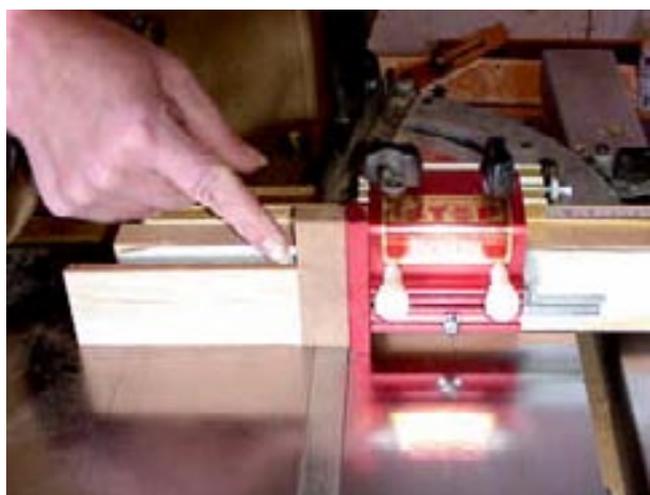
Since we want the wrap around, continuous grain look, Beth has set the Inca Stop to the first cut width of 5”



and she makes the first cut. The 5” length will give her one of the sides.



Since, each piece of stock will be cut 5”, then 4”, then 5” and another 4” to give the wrap around appearance, she uses a 1” spacer to make the 4” cut. Of course, if she were not worrying about the grain wrap-around, she could make all the 5” cuts and then the 4” cuts. Cutting in sequence takes a bit longer, but it will be worth it.



With the one board cut for the four sides, she lays them out in order. Since she is cutting parts for 10 boxes, she marks each piece with a number. The white mark will help to keep the parts in order. The number will allow her to assemble the right parts to each box.

Beth continues and cuts the parts for 10 boxes and a few spares, just in case.



Beth slides the Incra TS-III fence to the router section.

I had said earlier that the Exaktor Overarm Guard was removed so that we could shoot the pictures of Beth making the cuts. Now you can see that moving it just means rotating the guard 90o. This makes it very simple to use and then get out of the way.



Holding the shaft lock knob in with her right hand, she uses the bent wrench to tighten the collet with the locking miter bit in place.



She raised the bit to the approximate center line of the sample block,



She marks the two sample pieces with an “A” and “B”. It takes just a few minutes to set the router height and fence accurately.



I told you that we cut a few spares. It didn't take long to create a need for them.

Cutting the locking miter profile on the end grain of cherry can be difficult if things are not set up perfectly. It is very important to have total control of the small pieces.



Here is the mistake I had made. I used one of the pre-cut fence boards. I had selected the one that was closest to the size of the locking miter profile.

Normally, this would have worked fine, but the box pieces are so narrow, that they can twist in the oversized opening.

In this picture, we are simply illustrating the action and are not making an actual cut. The router is off.

It was clear that we would have to make a new “zero-clearance” fence.



Rather than to cut a new board for the fence, Beth adds a thin sheet of white coated hardboard to the existing fence. I had bought a sheet of this inexpensive, plain white panel that is sold for use as bathroom tub surrounds. It is inexpensive (\$20 a 4' X 8' panel) and is useful for making templates and serves well here.

Beth simply uses some double faced tape to apply it to the old fence.



She clamps the “new” fence in position. Note, that she has also used a width of the white hardboard to use as a temporary table top.



She raises the router slowly to allow it to cut an exact “zero-clearance” hole in the sheet that will be the temporary table top.



Then, she eases the fence into the spinning router to cut a fresh “zero clearance” hole for this setup.



Beth turns the MDF piece around so that she will have an uncut side to start her new cuts.

This push pad will be the “backer board” to minimize tear-out.



The smaller pieces (4"), that will be top and bottom, are shaped vertically against the fence. Here, Beth loads two pieces in the vertical holding jig I created. The small piece of MDF is used to put pressure on the short pieces from above the jig.

By the way, I have added a new piece of MDF to the left of the fixture. That new piece will help prevent tearout.



Now she makes the actual cuts. Her right hand keeps downward pressure on that piece of MDF, and her left hand keeps pressure on the jig. We have found that we can minimize tearout by keeping total control on the two small cherry pieces. Any movement on their part will cause a less than perfect cut.

Beth is also making the cuts in three moves of the fence so that each cut removes just a small amount.



And she shows off the final cut. It looks good.



All the tops and bottoms are done. There are 20 pieces needed, and she did a few for spares. Each piece has two ends and each corner was cut in three passes. So there were a lot of cuts made to this stack, but in fact the whole process went smoothly and took about 12 minutes.

On to the sides.



The side pieces were just that much longer so we felt that this hold-down arrangement would work well and be faster than using the jig we used for the vertical pieces.

Here, her right hand is controlling the push pad with the MDF base. It serves to keep the pieces perpendicular against the fence and be a backer board to minimize tearout. The closer push pad allows her to keep pressure on the side pieces. With the new “zero clearance” fence and table board, the cuts went smoothly.



About 10 minutes later, Beth has made on the cuts to the sides. There was some slight burning but very little tearout.



And, the moment of truth: Beth's first locking miter joint looks very good.



It's time to cut a groove for the front panel and a rabbet for the back.

With the table saw unplugged, Beth inserts the two outside dado blades. This will give her a 1/4" groove.



With the dado insert in place, she checks to see how smooth the small piece slides over the insert.

We decided to use some of the same white material to give us a smooth, zero-clearance insert for the 2 blade dado.



A couple of clamps are used to hold the large panel in position. The fence has been loosened so that it rides on top of the board.



With the saw on, she slowly cranks the blade height adjustment until the blade cuts its own 'zero clearance' hole.



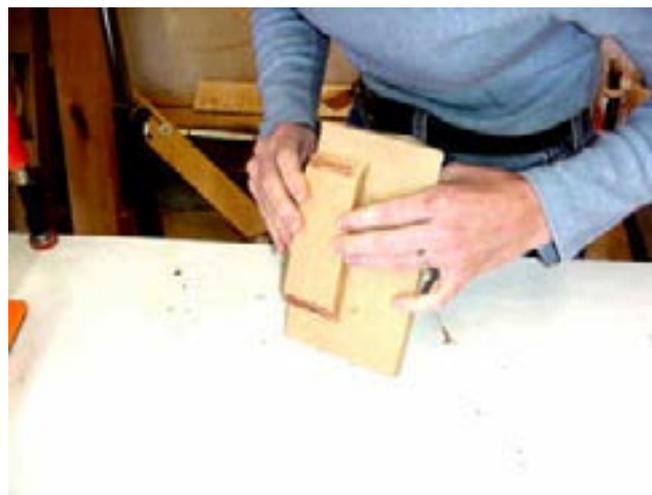
She clamps one of the router fence boards upside down to use as a "sacrificial" fence for the rabbeting operation.



Before she makes any cuts, Beth practices the operation. Using two push blocks, as before, would work. But, since we have about 50 pieces to run through twice, we decided to take a few minutes to build a holder that would make handling the small pieces better.



Here is the bottom of the MDF portion of the pushblock we used at the router. Beth has positioned the workpiece where it should be held.



This is the same pushblock with two scraps of wood fastened to hold the workpiece in position. Beth is now adding a small piece of rubber matting to further keep the workpiece from moving.



This view shows it ready to be lowered on the workpiece.



he makes the cuts. It took about 5 minutes to construct the special push pad, but it probably saved that much time, or more, in providing Beth a safer and quicker way to make the 80+ cuts,



And there you have both cuts made. The left dado will receive the front panel. The rabbet at the right, will hold the back.



Beth takes one box set and assembles the pieces.



She measures the inside dimension. The depth of the dado was just greater than $\frac{1}{4}$ " so she adds $\frac{1}{2}$ " to the measurement. This will allow her to cut a panel that will fit but not be too tight.



She rabbets the sized panel so that the piece will have a 1/4" edge that will fit smoothly in the clock case's groove. She is using a push pad that we often use at the router.



This is a better view of actually making the rabbet. The fence has been adjusted to allow a fraction less than 1/4" to be the width of the edge.



Here is the rabbeted panel. This is the back side showing.



It is time to dry fit the case and panel.



A proud Beth displays her first clock box.



She makes a mark where the clock should be located.



The clock requires a very exact $1\frac{7}{8}$ " hole. It should be exact since the cases are friction fit in this hole.

I have ordered a Forstner bit of that dimension, but it had not come in, so I cut a hole with a $2\frac{1}{4}$ " bit that I did have.

Beth has centered the clock panel under the cutout and clamps the form to the table.



Beth makes a plunge cut using a $\frac{1}{2}$ " up-spiral spiral bit and an edge guide that will give the $1\frac{7}{8}$ " hole.

One note about this method: I am using it here as a temporary method, just for this shoot. Using the proper size Forstner bit will be the better way to make this hole. When the bit arrives, we will do the rest of the panels.



While I may prefer to use the proper size Forstner bit, this method worked very well.



Before she glues up the box, she uses the Delta Bench Orbital Sander with 150 grit paper to give the panel and the sides one final sanding.

This sander is ideal for sanding these small parts. It takes only a few seconds on each surface to give the right finish.



She is getting proficient at fitting the assembly together.



A proud WoodShopDemos-U student displays her first project.

We opted not to glue the case at this point. While all the case pieces are cherry, the panels are from a number of different exotic woods. Our plan is to stain the cherry cases a medium dark cherry and finish the insert panel natural.

So, next time we will carry on from this point. We still have to make the side panels that will hold the little picture frames – and maybe even make wood hinges. That is next week. I hope you enjoyed this project as much as Beth and I did.



It is time to add the brass hinges — all 40 of them.



With the first box glued up, Beth tries mounting hinges. At this point, they are not mortised but just surface mounted. By the way, you can't see the center panel, since she has covered it with Saran wrap to protect the natural finish.



Here, she is trying to get an idea of how it will look on a cherry base and at what angles the side panels should be.



After looking at the hinges, Beth decides that they serve little purpose, and that she could mortise the sides into the center case. She marks where the mortise should be.



Deciding that the two sides should be at an angle of 15o, Beth has installed the stacked dado set and set the blade tilt angle to 15o. She uses a push shoe to guide the box over the dado set.



She is making progress. The tilted dado is cut on this first clock case. Now she figures out how large the base should be.



Beth re-saws a piece of 5/4 cherry. The half thickness should be just right for the base.



A few passes through the thickness sander, and all the saw marks are removed.



One last look before she cuts the base to length.



The new router table was all setup so Beth popped a new classic ogee bit into it and made the cut on three of the sides.



Beth displays her finished clock. Of course, there is still a lot of finishing to do, but she has resolved several issues and can now get going with the others.



This close-up gives you a better view of the shaped edge. It gives the whole unit a very finished look and is the ideal shape for this narrow wood.



On the last page, we showed the thought process and main steps in finishing the clock. We left out all the detail that took place over the past week/

Here Beth is sanding the clock panels between coats.



She is using Minwax Wipe-On Poly finish. Five coats, sanding with 220 grit paper in-between, seems to give the right finish.



With the clock panels totally dry, Beth wraps them in Saran Wrap. This will keep the cherry stain and finish from ruining these face panels. The thickness of the plastic wrap will not interfere with the panels being placed in the case dados.



She dry fits the pieces.



Beth mixes a very small batch of quick curing epoxy. This mix has about 6 minutes working time – just enough for assembling two clock cases.



She uses a disposable “acid” brush to spread the epoxy over the locking miter surface.



Two clamps pull the ends in nicely. She is careful not to over tighten them. Only gentle pressure is required.



Once the glue has cured, Beth can finish sanding the assembled boxes. The Delta Bench Orbital Disc Sander works very well here.



The 120 grit disc gives the completed case a very smooth finish.



With all the cases assembled, Beth turns to the finishing process. She uses cherry Minwax Wood Putty to touch up some of the tearout.



We didn't like the light color that the Minwax "cherrytone" stain gave us. Here, Beth mixes some dark color (walnut) into the cherrytone. A little bit goes a long way.



This darker color is more to her liking.



A day later and Beth can now start to add a finish. She is using the same Minwax Wipe-On Poly finish that she used for the clock faces.



It takes several coats to build up the right finish, but the wipe on finish is quick to do.



With one unit completed, Beth can insert the picture frames with photos of her two cats. She also can remove the plastic wrap which has been protecting the clock insert.



With the based attached, she can admire the finished unit. This has been a fun project – certainly a good first project for the Beth, the first WoodShopDemos-U student.

