

Project Tutorial

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Vetric Project Tutorial
www.vetric.com

Compatible with:
VCarvePro 7
(or greater)

and
Aspire 4
(or greater)

Sample Carved with:
ShopBot Buddy
PRSalph BT48

ShopBot®
www.shopbottools.com

Offset Finger Joint Box

Designed for Vetric™ by Michael Tyler

This project introduces a nice technique for creating finger joint corner joinery without having to worry about internal corner bit radiuses (radii) to chisel out by hand. The finger joints are automatically tight and square - just like a finger joint should be! No need for any special jigs of any kind. The method is EASY and SIMPLE and can be done on any standard CNC machine.

I believe this particular type of CNC joinery method is in its 'infancy' and I hope that some of you will experiment with it to come up with your own interesting variations!



Finished dimensions
are about:
5.75" W x 5" D x 3.75" H

The box lid can be customized with any person's initial in the center of the existing delicate V-carve design. The box would also look very nice with the sides and front/back panels machined in contrasting wood colors. You can easily modify the project layout as you wish.

Main items you will need:

1) The Project Files (included):

- Box-Sides_Layout.crv
 - Lid_Only.crv*
 - Lid-and_Base_Layout.crv
- (*use this Lid_Only file if you prefer to cut out your own base manually, like I do.)

2) Boards with these dimensions:

- Box Sides:** 0.75" x 8" x 13"
- Lid Only:** 0.75" x 6" x 7.5"
- Lid and Base:** 0.75" x 6" x 13"

3) Box Hinge(s)

(I used a Brainerd #1264XC 4" piano hinge)

4) Sandpaper, wood sealer, stain or paint and clearcoat

5) A Dremel-type rotary tool with assorted sanding wheels and bits to sand small details and speed up preparation for finishing.



CNC Bits used for the Sample:

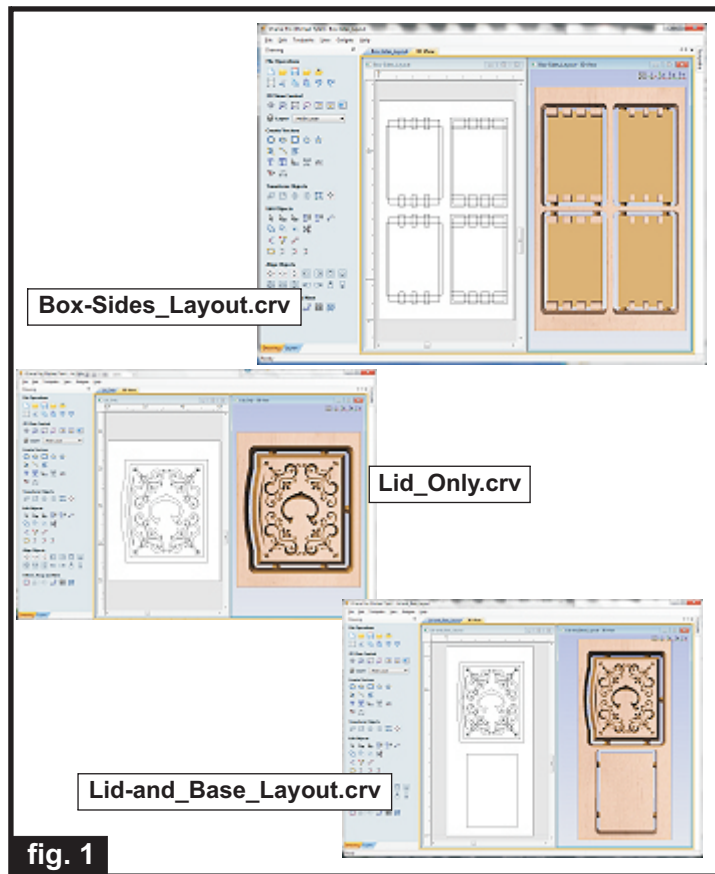
- 60 degree V-Bit
- 90 degree V-Bit
- 0.25" EM Up-Cut - see pg. 5 for details (for smoother finish on large pocket areas)
- 0.25" EM Down-Cut - see pg. 5 for details (for small slot pockets and cutout profiles)

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(cont.)

STEP 1 - Open and Review the Project Files

Start your VCarve Pro or Aspire software and open the project files. (fig. 1)



Carefully review all the toolpaths and make any necessary changes to suit your particular bits and machine. The toolpaths are currently set with feeds, speeds and pass depths that were used in creating the original sample. Please don't use them directly until you review them for your own setup.

You can edit the tools and change the settings to your own preferences and requirements. The component layout is arbitrary - feel free to rearrange the components to fit the dimensions of whatever material you may be using. **It is very important to recalculate all toolpaths after making ANY edits/changes.**

Once you have recalculated for your own machine and bits, reset the preview, then preview all toolpaths again to visually verify the project outcome on-screen. The project is designed with tabs to hold parts in place during the final part cut outs. You may delete the tabs if you use some other reliable hold-down method.

NOTE: You have an option as far as the Lid and/or the Lid-and-Base files. I prefer to cut the base myself for a project like this (i.e., assemble the box sides, then trace inside the box onto a board to cut manually on a table saw), so I used just the Lid_Only file. Generally, it's more accurate to trace and cut the base for a perfect fit. However, you may use the Lid-and-Base_Layout file if you want your CNC to cut out the box Base along with the Lid.

STEP 2 - Run the Project

When you are satisfied with your settings, save the toolpaths to the appropriate Post Processor for your machine, place your material on your machine bed and proceed to run the files. (fig. 2a, 2b)



STEP 3 - Release Parts and Sand

Separate the parts from the material, then sand off any tab remnants and undesirable toolmarks. (fig. 3)



(cont.)

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(cont.)

STEP 4 - Test Fit

Dry-fit the box panels. The fit should be snug, but have a tiny clearance amount to allow for glue.

(fig. 4a, 4b)

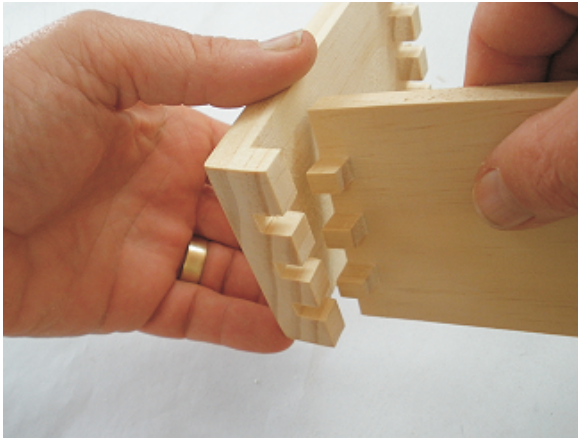


fig. 4a

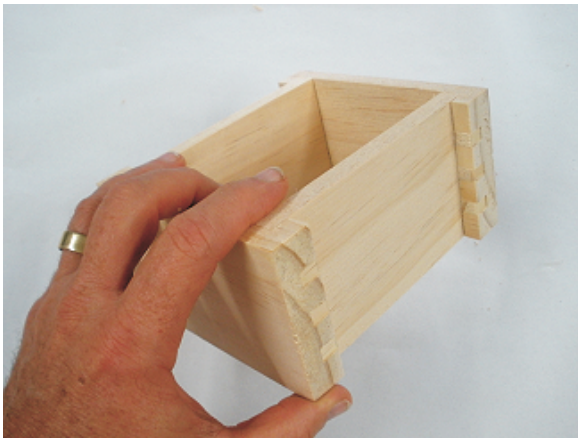


fig. 4b

The accuracy of fit can be influenced by your machine's performance, flatness of your bed, amount of bit runout/deflection and feed settings. You may want to consider doing a preliminary test cut of just one side and one front/back panel to check the fit before running the entire project.

The "fingers" and "slots" are separate vector shapes, so if you find you need to make any size adjustments, this can easily be done with the Rectangle Tool or the Set Select Objects Size tool. I recommend adjusting only the width of the 0.285" slots. The Vectric software will automatically adjust any new width setting equally on both sides of the existing vector shape as long you have the anchor position set to the center, keeping it's exact location alignment intact, no problem.

(Don't forget to RECALC all the toolpaths if you make ANY changes whatsoever!)

The slots already have a 0.025" allowance for the 0.26" narrow fingers. This allowance yielded a perfect fit for the prototype, but don't be afraid to make any adjustments, if you need to. (fig. 4c)

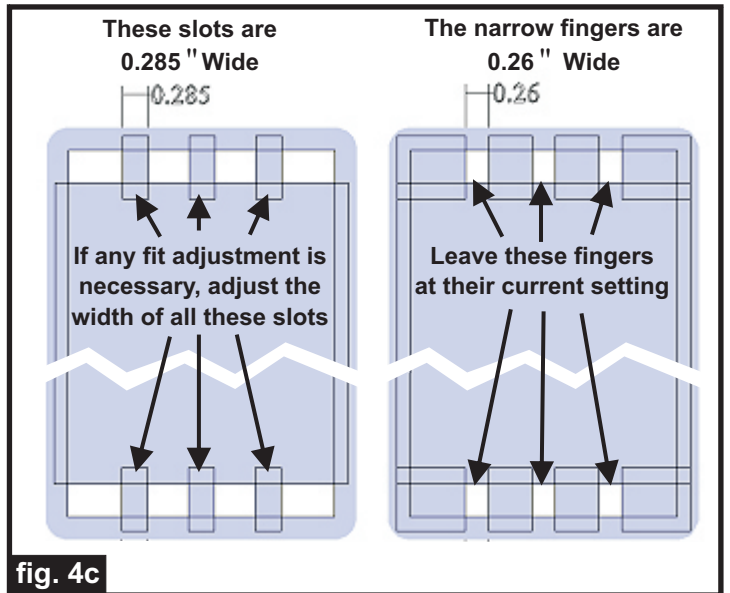


fig. 4c

If you are cutting your own box base/bottom, place the dry-fit assembly atop a 0.5" or 0.75" thick board and trace the inside of the box onto the material. Cut the box base/bottom with your table saw. (fig. 4d, 4e)



fig. 4d



fig. 4e

(cont.)

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STEP 5 - Assembly

Disassemble the box sides, then glue one end panel and the front and back panels and the base/bottom together. Apply the glue sparingly with a small brush. (fig. 5a)



fig. 5a

Glue the final end panel in place, and wipe away any glue squeeze-out with a damp rag. (fig. 5b)



fig. 5b

After the glue has dried, final sand the exposed finger joints flush and smooth! I used a 1" belt sander to speed up the job. (fig. 5c, 5d)



fig. 5c



fig. 5d

STEP 6 - Finish Application and Final Assembly

You can install the hinge(s) now or after finishing. I installed mine after a straight shellac finish was applied. In any case, you need to remove the hinges before applying the finish. Center the lid side-to-side on the top of the box with the back edge of the lid positioned flush with the back panel's recessed edge. Tape the lid securely in place with blue painter's tape. (fig 6a)

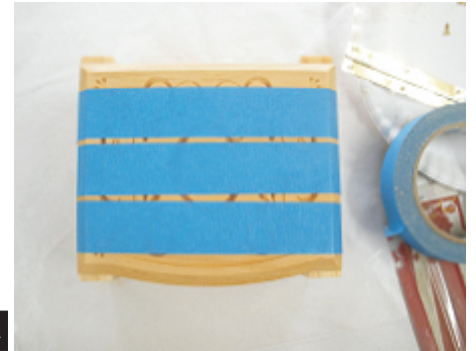


fig. 6a

Drill small pilot holes for the hinge screws, and install the hinge. I used a 4" piano hinge, but two small hinges could be used instead. (fig. 6b)

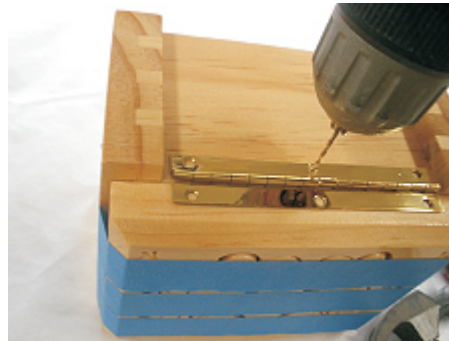


fig. 6b

Remove the tape and check the lid action. To complete the project, apply felt, cork or silicon self adhesive discs to the underside of the box. You could also apply self-stick felt or flocking inside the box, if desired. (fig. 6c)



fig. 6c

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IN CONCLUSION

I hope you enjoyed this intro to the offset finger joint technique. The box project example makes a quick and easy gift item too!

You will notice in the toolpathing details for the Box-Sides_Layout.crv file that some of the feed rates seem slower than “normal”. This was intentional and is meant to minimize tear-out of material during machining. You may discover you can adjust the feedrates higher, but I tried to be conservative for this example.

Also, I specified two different End Mills for the large pockets and slots in the Box-Sides_Layout.crv file. The idea here was to use the UP-CUT end mill for the large pockets to yield a smoother finish on the surface. The DOWN-CUT end mill keeps upward tear-out of the “fingers” to a minimum (or eliminates it altogether) and is also used for the final profile cutouts.

I actually cut the prototype with just a Down-Cut end mill (in my attempt to save you a bit change!), but had more sanding to do on the faces of the large pockets than if I had used the up-cut instead. So I modified the files for you to reflect the more “correct” bit choices for each toolpath operation. One thing I want to try sometime is a Compression Bit to see how that performs on the pocket and slot cutting (i.e., combines both up and down cutting in one bit).

Happy Carving!

Michael



Materials Source Page

- 3M Radial Bristle Discs from www.mcmaster.com
(stack 3 discs at a time on your rotary tool mandrel)
80-grit: part # 4494A19
220-grit: part # 4494A18



Items Purchased at Lowes™

- Zinsser Bulls Eye 100% wax-free Spray shellac



Items Purchased at Michael's Arts and Crafts™

- Small Box Hinge
- I used model #1264XC, but there are several styles to choose from



Additional Resources

RESOURCES...

There are numerous resources for Vectric software owners to make their experience with their products more enjoyable. The Vectric website includes video tutorials and more, to provide a good overview of the software products and how to use them. Please visit the Support page for a complete listing of available resources for you.

Vectric Support: <http://support.vectric.com/>

Vectric User Forum

Every owner should join the Vectric User Forum (<http://www.vectric.com/forum/>) where fellow users share their experience and knowledge on a daily basis. It is a FREE service that you will surely appreciate. A handy Search Feature helps you find answers to any questions you may have. There are Gallery sections as well, where you can post and view photos of projects created with Vectric software.

IMPORTANT: Before outputting any toolpaths you should carefully check all part sizes and the material setup to make sure they are appropriate for your actual setup. You should also check and re-calculate all toolpaths with safe and appropriate settings for your material, CNC machine and tooling.

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