Vectric

Passionate About CNC

It is our pleasure to provide our customers with fun and useful projects to enjoy!

Compatible with Current Version of:

VCarve PRO

and

Aspire

Sample Carved with:
ShopBot Buddy
PRSalpha BT48

ShopBot®
www.shopbottools.com

Vectric Wooden Chain
### Designed for Vectric™ by Michael Tyler

This project demonstrates how easy it is to create a wooden chain with your Vectric software and CNC machine.

In the past, this project would have required Aspire in order to run it. The chain link model itself was indeed created in Aspire, but imported (as an STL) into the new Vcarve Pro software where you are now able to directly machine 3D relief models! Please visit vectric.com for complete details on this new feature and many more.

This is a two-sided carve with 14 link models on the front and 14 link models on the back of the material.

The project yields a wooden chain about 27" long. I used 3 of the links to create a "doo-dad" conversation piece, so the photos of the sample chain you see here only utilized 11 links. You can make a chain as long as you wish - just run the project as many times as required.

Borromean Chain Rings "doo-dad"
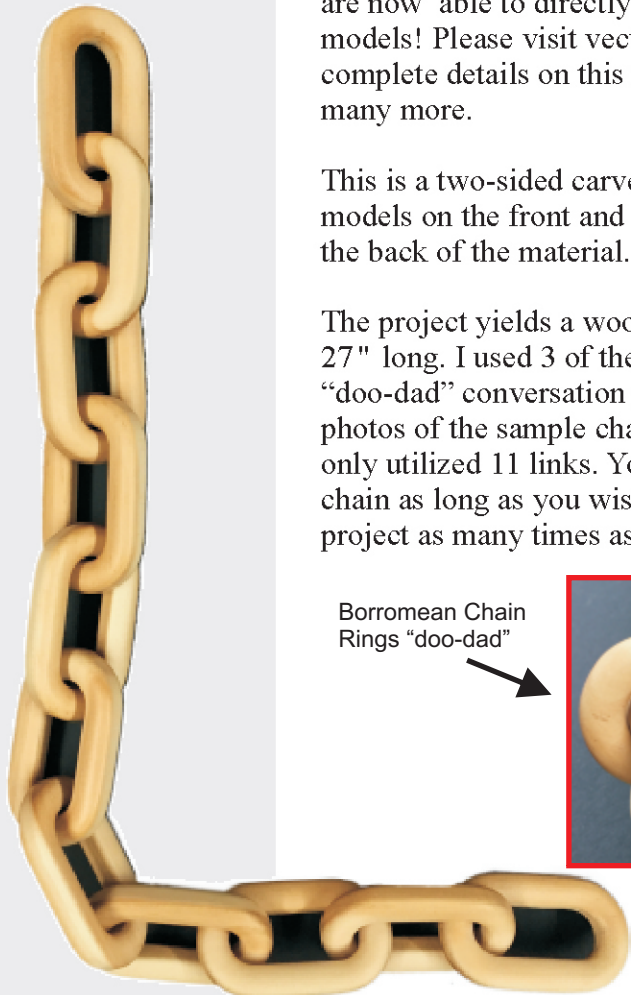
Main items you will need:

1) The Project Files (included):

• Chainlinks_SIDE-A.crv
• Chainlinks_SIDE-B.crv } File Pair

2) Board with these dimensions:
0.5 " x 5.5 " x 24 "
(two-sided project using one board)

3) Two 0.25 " dia. dowels, glue, sandpaper, clamps or rubber bands, stain/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.
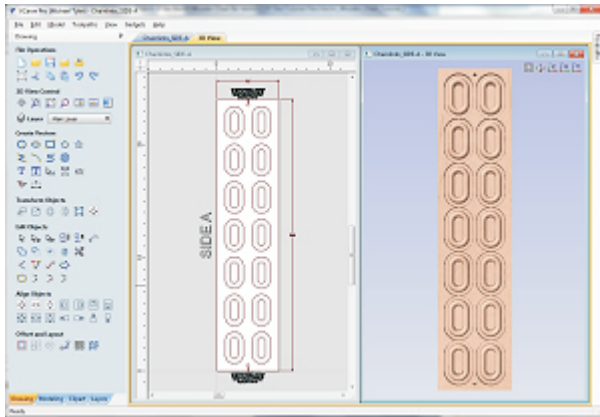
CNC Bits used for the Sample:

0.25 " Up-Cut End Mill
0.25 " Down-Cut End Mill
0.25 " Ball Nose

Designed by Michael Tyler - MAY 2015

STEP 1 - Open and Review the Project Files
Start your Vcarve Pro or Aspire software and open the project files. (fig. 1)
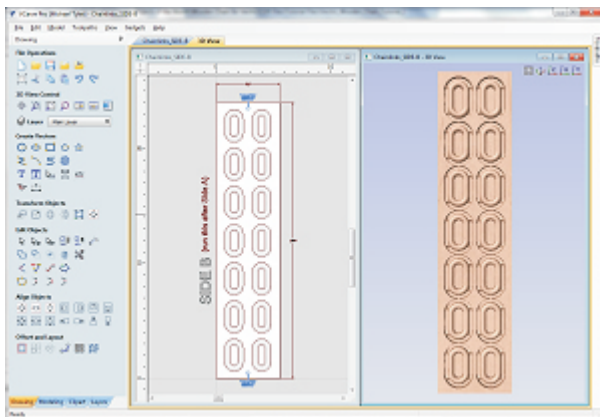
Run SIDE-A First

Chainlinks_SIDE-A.crv

Run this file first.

Flip Board and Run SIDE-B

Chainlinks_SIDE-B.crv

Flip over material, then run this file second (on the back of Side A).

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. **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.

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 in the order specified in Step 1. (fig. 2a, 2b)

Chainlinks_SIDE-A.crv

fig. 2a

Machine the Chainlinks_SIDE-A.crv file first. After machining that side, flip the board over across the (shortest) width. Insert the two alignment dowel pins into the holes in the spoilboard and replace the board onto the pins with the plain side up and re-apply your hold-down method. Run the Chainlinks_SIDE-B.crv file to complete the machining process.


Chainlinks_SIDE-B.crv

fig. 2b

(cont.)

STEP 2 - Run the Project (cont.)
Additional information for two-sided carving...

For the alignment holes of the prototype sample, I set the depth of the drill toolpaths to 0.85 " when I ran the first file (i.e., the **Chainlinks_SIDE-A.crv**). This drilled all the way through the 0.5 "-thick material and into the spoilboard, creating the two alignment holes in the spoilboard about 0.35 " deep to insert the 0.25 " dia. alignment dowels for placing the flipped board upon. (fig. 2c)

fig. 2c
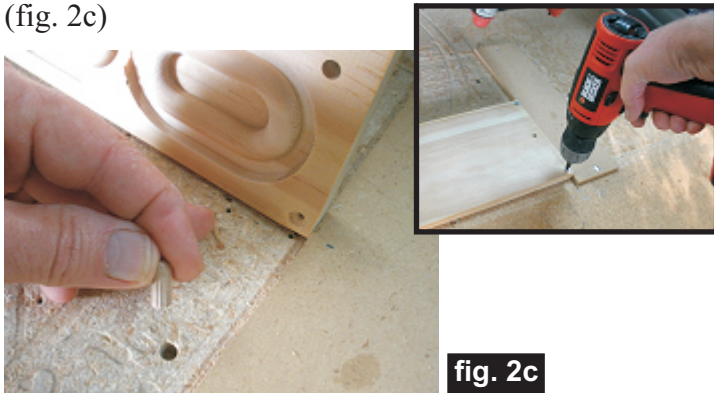
Inserting a couple dowels (I use grooved glue dowels) into the holes in the spoilboard and into the material holes, yields perfect alignment between the Side-A and Side-B when flipping the material over and reapplying your hold down method to prepare for machining.

Alternatively, you can set up a drilling toolpath on the first side of the material that is ~0.55 " deep. Then after completing the first side, rezero the bit to the machine bed and drill the same holes giving you a total depth of 1 "+. Using 1 "-long glue dowels, this works great.

Another consideration with this alternate technique is you don't have to maintain the same X,Y zero location. You can move the spindle to a different location, rezero X and Y and then continue with drilling the holes in the spoilboard, placing the material and machining the second side.

For more detailed information about 2-sided machining, visit http://support.vectric.com/ and view the "2-Sided Machining Guide Tutorial".

STEP 3 - Separate Parts from Material and Sand
Separate all the pieces from the board with a utility knife or hobby saw. Sand all the components to remove the tabs and any undesirable tool marks. I used a Dremel-type tool with various abrasive wheels and tips and a small belt sander to make the job go faster. (fig. 3a, 3b, 3c)

fig. 3a

fig. 3b

fig. 3c

STEP 4 - Chain Assembly
You will need to break apart every other chain link in order to join the links together. (They will be broken in half lengthwise along the grain. One broken link will join two unbroken links.)

The links are broken by clamping in a vise, then rapping sharply with a block of wood and hammer. A link will tend to break like it "wants to". This method allows the link to be glued back together along the natural break making it difficult to see the seam. *(cont.)*

STEP 4 - Chain Assembly (cont.)

Clamp a link in a vise with about half of the link rising above the jaws of the vise. Use a block of wood and a hammer to sharply and quickly "knock" the top half off the bottom half. Repeat for the remaining links. Keep the split halves with their mate. (fig. 4a, 4b, 4c)

Insert a link in a vise, with the top half extending above the jaws

fig. 4a

Sharply and quickly, hit the wooden block held against the link with a hammer to "snap" the link in half along the grain. One quick "hit" should do it.

fig. 4b

fig. 4c

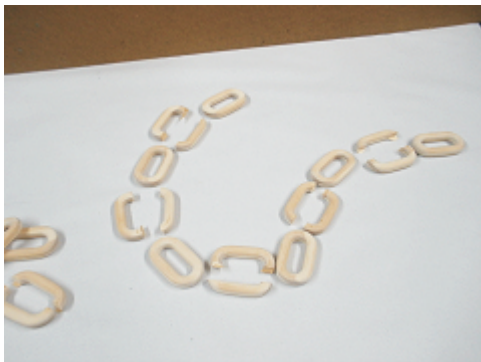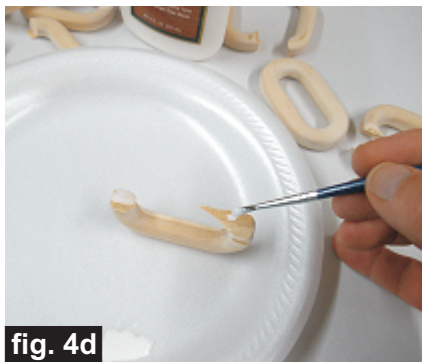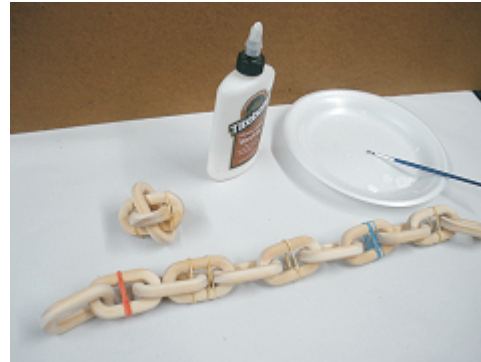**fig. 4d**

Glue the split links to join the solid links. Apply glue with a small paint brush. Use rubber bands as clamps while the glue dries and wipe away any squeeze out with a damp towel. (fig. 4d, 4e 4f)

Wipe away glue squeeze out with a damp rag or paper towel

fig. 4e

Glued chain clamped with rubber bands while glue dries.

fig. 4f

STEP 5 - Finish Application

After the glue is dry, remove the rubber bands and sand the seams to blend. Apply your choice of finish. Here's what I used on my wooden chain made from Select Pine (fig. 5a, 5b):

• Dipped in Zinnser Bulls Eye SealCoat thinned 50/50 with denatured alcohol, then lightly sanded

• Several light coats Krylon Clear Acrylic spray overall

Dipping the chain into 50/50 thinned SealCoat

fig. 5a

Spraying the chain with Krylon clearcoat. Chain is hung and "jostled" occasionally to keep the links from sticking together.

fig. 5b

IN CONCLUSION

I hope you enjoyed making your Wooden Chain! There are a couple new features in the new VCarve Pro software that came in handy during the project creation. Namely, the ability to import a 3D STL relief model and machine it directly, as well as the new **Create Job Sheet** feature which creates a detailed summary of each project file for your reference. (fig. 6a)

There is another feature you can try, that might not be readily apparent without a mention of it. That is, the new **Merge Toolpath** feature (found in both the latest versions of VCarve and Aspire). You may have noticed in the Toolpath menu there are 14 individual Finish Toolpaths that correspond to each individual chain link in both project files (SIDE-A and SIDE-B). This was done intentionally so you could try the Merge Toolpath feature yourself, just for fun!

From the manual, here is a brief description: *"Using the toolpath merging options it is possible to take toolpaths which use the same tool but perform different operations such as pocketing and profiling and create a single toolpath which performs the same cutting operations in an optimized order."*

In other words, you can select all 14 of the Finish Toolpaths and Merge them into a single toolpath. The feature is really designed for merging differing functions using the same bit, but the example of the merging of the Finish Passes is a simple way to see how it works. Please refer to your VCarve Pro or Aspire manual (accessed via the Help Menu of the software) for the complete and important details of this new feature.

Happy Carving!

Michael Tyler

Create Job Sheet creates html files showing a summary of all bit and job details.
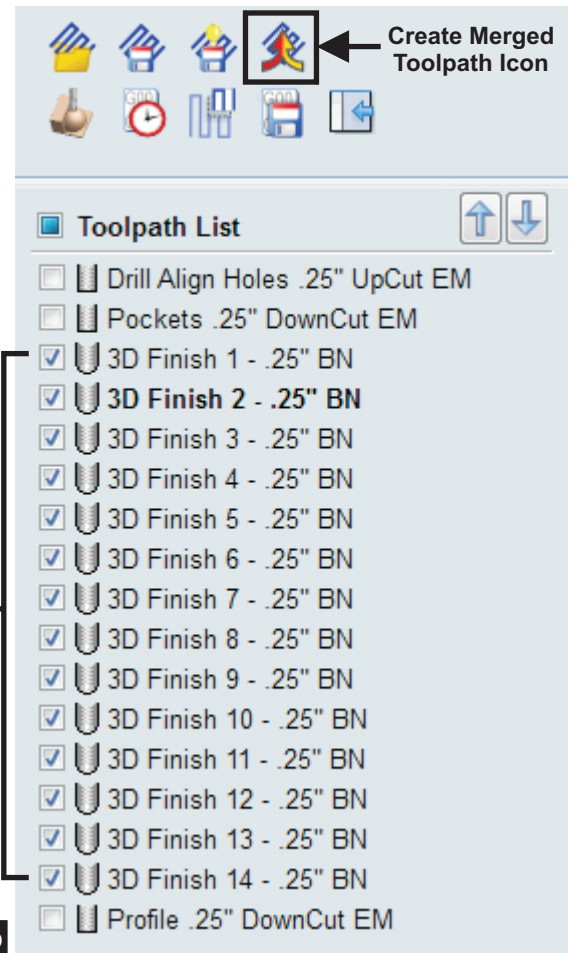

fig. 6a

Create Merged Toolpath Icon

Merge these 14 Toolpaths into 1

fig. 6b

Materials Source Page

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

<u>Miscellaneous Items Purchased at Home Depot™ or Lowes™</u>

• **Zinsser Bullseye SealCoat and Denatured Alcohol**
• **Disposable Brushes and Paint Rags**
• **0.25 " dia. wooden glue dowels**

Krylon Clear Gloss Acrylic
from WalMart™

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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