Pierce Carving

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Photo 1 This is the project for this Demo

Photo 2 NSK 850A Dental Tool

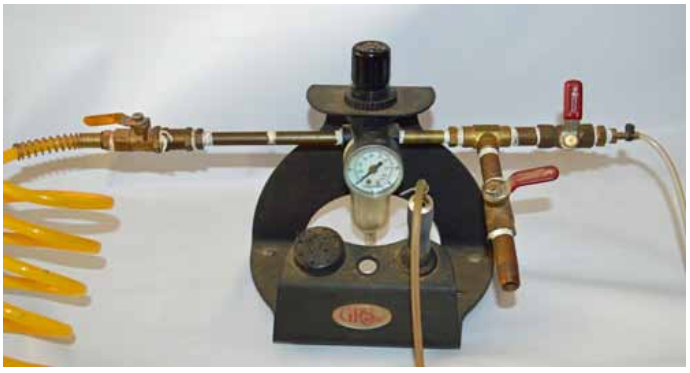

Photo 3 My Piercing Tool Stand

Photo 4 699 and 169L Burs

Would you like to add a little artistic flair to your wood turnings? Have you been thinking about ways to spice up your work? Want to add that WOW factor to your turnings? Do you want that " How did you do that" response from others? I have just the project for you. As you will see this works for all types of turned vessels, bowls, vases, hollow spheres, anything turned thin, 1/8" or less. They can be solid wood, segmented, or even natural edge vessels. You will be limited only by your imagination. This article is a tremendous thought starter. I use a high speed dental drill and techniques that really simplify the process. You can be cranking out more artistic pieces in no time.

Note: There is a list of tools and products used at the end of this article.

I would like to thank two of my mentors, Barry Harding and Binh Pho.

Safety

I use a magnifying lens head piece when piercing. I also have a fan blowing air away from me to keep the smoke out of my eyes. You will be piercing a small hole through the wood. You need to be cautious of where your other hand is holding the work.

Getting Started

In this article I will discuss a few design aspects of incorporating pierce carving into your design. I will cover positive and negative space. There are several ways to get a design or pattern on the wood as we will discuss. You will find out which tools are needed and how to use them. So lets have some fun. ***Photo*** 1 shows the project we are using for this handout.

Tools Needed

Lets start with the piercing tool. I use a NSK 850A pneumatic dental drill. This tool does not need oil as the bearings are sealed. It operates at 320,000 RPM's at 35 PSI of air. The tool only accepts 1/16" shank burs. See ***Photo*** 2. Requires 1.5 CFM at 35 PSI.

There are many brands of turbo carvers on the market, this is the one I like and use. I feel it delivers a bit more torque. Suppliers for these are listed at the end of the article.

Photo 5 Bur Packaging

Photo 6 Example Compressor "Kobalt"

Photo 7 Example Compressor from Northern Tool

You will need a way to turn the air on and off. Also a way to adjust the air pressure to 35 PSI. I have a tool stand that has air hookup fittings, a regulator, an on and off valve, and a place to hold the tool when not in use. See ***Photo*** 3 . This unit came from GRS Tools. My unit originally had a variable speed foot control. After an hour or so I would notice the tool not cutting as well as it was. Then I noticed my foot was relaxing off of the foot control, so I removed it. Just remember to hold the tool until you can turn off the air manually.

Now lets discuss the carbide burs used in the tool. They are 1/16" shank and solid carbide. The burs used are the same ones the dentist's use. The primary bur I use is a 169L, the 699L is similar. The "L" stands for long. The 699 bur has a flute cutting length of 4.2 mm. The "L" has a cutting length of 6 mm, See ***Photo*** 4. This will allow you to pierce a bit thicker wall thickness. The 169L bur is a tapered fissure bur. The bur is only .9 mm diameter at the tip. The tip is blunt and not pointed, but still pierces the wood easily. ***Photo*** 5 shows the bur packaging with part numbers. There are other styles of burs as you find uses for them.

You need a compressor that will deliver at least 2 CFM, cubic feet per minute, at 35 PSI, pounds per square inch. Most compressors with at least a 3/4 HP, horse power, motor will be adequate. My compressor delivers 17 CFM, at 90 PSI. This is a bit overkill but I use it for other things such as sanding.

Photo 6 shows an example of another compressor sold by Lowes, #57655. It is a 1.5 HP with a 3 gallon tank. Max air presurre is 155 PSI. It will deliver 2.6 CFM at 90 PSI and 4 CFM at 40 PSI. The cost is $139.00 at the time of this writing.

Photo 7 shows an example compressor sold by Northen Tool, #42967. It is 1 HP with a 3 gallon tank. Max air presure is 125 PSI. It will deliver 2.4 CFM at 90 PSI and 3.7 CFM at 40 PSI. The cost is $99.00 at the time of this writing.

Now lets discuss being able to see the fine detail work that you will be doing. I use a magnifying lens head

Photo 8 Magnifying Visor and Lens

Photo 9 Head mounted light

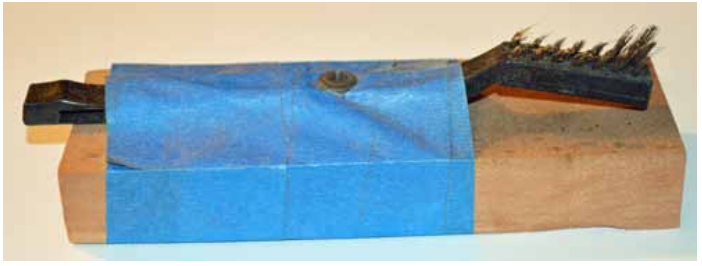

Photo 10 Flute Cleaning Brush

piece, like the one in ***Photo*** 8. This a system that fits on you head like a visor. You will purchase the visor and a lens separately. There are different lenses available based upon your vision and distance where you will hold the work from your eyes. You will need to try different lenses until you find the right one. You will be able to see better with this than anyone will be able to see with the naked eye. Minor flaws will not be noticed as easily this way.

You will need a lot of good lighting. Your hand and the tool will cause shadows that will make it hard to control the closeness of the tool to the wood. I use light coming from several directions. Try to place lighting overhead, shining on the front, and from both sides. For the light shining on the front I use a light that is on a strap that fits around my head, see ***Photo*** 9. I just place it around the band of the magnifying lens. If you can't see the point where your tool is cutting you will make mistakes. Adjust the lighting or the position you are holding the piece so you have the best possible view of where you are working.

The dental drill turns so fast it does more burning than it does cutting. The oils in the wood will gum up the flutes of the bur. As this happens the cutting speed of the tool slows down. This feels like the bit is getting dull, but it is not. The flutes need to be cleaned every few minutes, time depending on the type of wood you are using. The wood will never dull the bur as it is solid carbide. To clean the bur just run it along a piece of soft steel or other metal. I use a small stainless or brass brush, See ***Photo*** 10. You can mount the brush to a block of wood so you can clean the flutes with one hand, eliminating having to put your piece down while cleaning the flutes.

As there is smoke it needs to be removed to keep it out of you eyes. Place a fan so it blows over your shoulder, sort of from the rear, so it blows the smoke away from your face. Don't place the fan in front of your face as it will blow the smoke into your eyes.

You will need a comfortable place to work. You should have a table top with a soft pad to protect the wood surface. You will be spending hours setting at the table working in close quarters. Make it as comfortable as possible.

Photo 11 Positive Space

Photo 12 Negative Space

Photo 13 Using Positive and Negative Space

Photo 14 Draw Art on by Hand with a Pencil

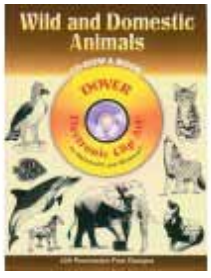

Photo 15 Royalty Free Line Art

Photo 16 Applying Image with Carbon Paper

Design

Here we will discuss the design of your piercing. This can be images, patterns, following the grain of the wood, or totally random. We also need to cover the way the image will stand out. You can use positive or negative space or a combination of both.

Positive space is where you will pierce around the image making it stand out prominently, See ***Photo*** 11. You have a solid image with the background being pierced. Negative space is where you pierce the image and leave the background solid, See ***Photo*** 12. The image stands out less prominently. Doing a combination almost hides the image only displaying it when looked at a certain way, See ***Photo*** 13. Here the image and background are both pierced leaving a thin outline of the image. You can almost miss the image if not paying close attention.

How do we get our design or image on the wood? There are several ways. First you can draw the image on with a pencil, lead from the pencil sands off easier than ink from a pen. If you are good enough you can draw you own original art onto your pierce, See ***Photo*** 14.

If you can't draw you can find an image you like. This can be a line drawing or picture you found in a magazine, or the web, or from purchased royalty free software, See ***Photo*** 15. There are several titles of these available. There are hard copy line art drawings as well as a CD with the drawings electronically. The files are in multiple formats.

The image can be applied to your piece by transferring with carbon paper. Place a piece of carbon paper behind your image and tape it on the work piece. Trace the image and this will leave the carbon from the paper on the wood See ***Photo*** 16.

You can print an image from a laser printer or copy it from a copier. The image must be from dry ink and not liquid ink like from an ink jet printer. Tape the image on the wood upside down, with the ink touching the wood, See ***Photo*** 17. You can see the image through the paper. The image on the paper needs to

Photo 17 Dry Ink Image Upside Down

Photo 18 Rub Zylene Over Image ***Photo*** 19

Photo 20 Rub the paper with A Plastic Card

Photo 21 Remove Paper and Tape to Reveal Image

Photo 22 Blender Pen

Photo 23 pierce the sap wood or rim ***Photo*** 24

be a mirror image of what you want on the wood.

You can rub Zylene over the paper and wetting it, See ***Photo*** 18 and 19.

Rub the paper with a squeeze or plastic card like a credit card, See ***Photo*** 20. This will help the Zylene release the ink from the paper on to the wood.

Remove the tape and paper from the wood and the image will be on the wood, See ***Photo*** 21.

There are commercially available transfer pens with a felt tip that is full of Zylene for this purpose, See ***Photo*** 22. When my pens get empty or drys out I refill them with Zylene from a can.

But you can just use a Q-tip soaked with Zylene to rub the back of the paper. Continue this until all of your design is on the wood.

You may not want a design on the wood. It may be just as simple as piercing the sap wood around a natural edge bowl, See ***Photo*** 23. Here pencil a line approximately 1/8" from the heart wood and the bark. You will pierce randomly in between the pencil lines. If your piece has dark heart wood and light sap wood this produces a dramatic effect.

You could also just pierce a band around the rim, See ***Photo*** 24. Draw two lines around the rim. The first about 1/8" down from the top and another below that to define the width of the band you want.

The type of design is only limited by your own imagination. You can really have fun with this.

Time to Pierce

Now that we have our design on the wood it is time to pierce the first hole. It will be almost impossible to describe in words how to pierce carve. A video, or hands on learning, would be much better at conveying the information. But I will give it a try.

With all of the safety concerns covered above and all of the required tools setup lets start. The piercing tool needs to be perpendicular to the wood at all times

Photo 25 Keep Tool Perpendicular to the Wood

Photo 26 Pierce a Hole

Photo 27 Move Counter Clockwise to Clean Up Burs

Photo 28 Each Hole will Follow Previous Holes

Photo 29 Try to Maintain An Even Wall Thickness

while piercing, See ***Photo*** 25. This will be a constant struggle to maintain. If you don't do this the amount of wood left between the holes will be thinner on one side than the other. Also when the piercing is completed you can see the leaning cuts.

Before piercing my art work I practice on a piece of scrap to hone my piercing. If you don't your art work may have a spot that looks like a beginner worked on it as the rest of the work will get better.

On the piece we are using for this handout lets pierce a hole, See ***Photo*** 26. Push the bur through the wood. Moving clockwise make a free form hole that is a bit wiggly, looking like an amoeba. An amoeba is a single cell organism with no definite shape, just kind of free form. Start away from the image about the distance you want the size of your hole to be. With a wiggly motion work back toward and against the image. Complete the hole by working back to the beginning of the piercing.

There will be some burs and a black edge around the hole, See ***Photo*** 26. Clean this up a bit by moving the bur counter clockwise around the hole, See ***Photo*** 27.

Cut another hole next to the one just completed. The second hole will follow a portion of the first hole and so on. See ***Photo*** 28.

While you continue piercing you will always try to maintain an even wall thickness with a cut that is perpendicular to the surface of the piece, See ***Photo*** 29. As I said this will be an on going effort for ever. Always start a hole away from the previous holes and work back toward the existing holes then back to the starting point. Each hole is free form except where it follows the previous holes.

Try not to line up all of the cuts in a row. Try to make them look a bit like a brick wall, where on the second round the hole splits the two below it, See ***Photo*** 30. Now you will follow a portion of the other holes with the bur.

As the cutting slows down clean the bur. As you can see in ***Photo*** 26 the bur is gummed up. Run the rotating bur over the brush to remove the gum. Clean the

Photo 30 Make a Pattern Look Like a Brick Pattern

Photo 31 Pencil and Scorch Marks Left After Piercing

Photo 32 Sand with 400 Grit to Remove Marks

Photo 33 The Finished Piece

bur when ever the cutting speed slows down.

While piercing remember to maintain awareness of where the hand is that is holding the work piece. Believe me it is very easy to forget and pierce your hand or a finger. This does hurt, but will not bleed as the bur is so hot it cauterizes the hole in your hand or finger.

Continue piercing until your eyes get tired, or just before. For me this is about 60 to 90 minutes. If I go past this my chances of making a mistake increase significantly. Take a short break or work on something else for a while.

Continue piercing until art piece is complete.

After completion there are still pencil or carbon marks on the piece. There will also be scorch marks from the heat generated by the rotating bur, See ***Photo*** 31.

Now you need to lightly sand the pencil marks and scorched areas off with 400 grit sandpaper, See ***Photo*** 32. Sand inside and out as there will be scorch marks on both sides.

Look the piece over and critique your work, See ***Photo*** 33. Make mental notes as to areas that do not look 100%. Work on these issues on the next piece. You will always be striving to get better and better. You will never reach perfection in your eyes, although others will think so as they are not looking through the magnifying visor.

Tools and Suppliers

Tools	Suppliers
NSK 850 A Dental Drill	Tree Line - www.treelineusa.com #112-2101
	Binh Pho - http://www.binhpho.com
	www.utahhandpiecerepair.com 801-210-0479
	http://www.grstools.com/rotary-systems/ultra-850-rotary-system.html
Stand and Regulator	Tree Line - www.treelineusa.com #112-2101
	Binh Pho - http://www.binhpho.com
Carbide Burs - 1/16” 699L	Tree Line - www.treelineusa.com #221-S003
169L and 699L	Binh Pho - http://www.binhpho.com
Blender Pen with Zylene	http://www.dickblick.com/items/21303-0000/
Chartpak Colorless Blender Pen	www.amazon,.com
Zylene in a can	Home Depot
Magnifying Visor and Lens	Tree Line - www.treelineusa.com #112-0100
	http://www.woodcraft.com
Head Light	Home Depot
Small Stainless or Brass Brushes	Home Depot
Line Art Books and CDs	Tree Line - www.treelineusa.com #079-0114
Stainless Steel and Brass Brushes	Home Depot
Compressors	Home Depot, Lowes, Northern Tools

Quick List of Steps

1. Create a work space with a table and a soft top .
2. Setup adequate lighting and a fan to blow the smoke away.
3. Acquire the tools needed, piercing tool with regulator stand, burs, compressor, magnifying visor, wire brush and a head lamp.
4. Get royalty free line art if needed. Draw your images onto your wood, trace on with carbon paper or apply with Zylene.
5. Get your work piece and determine what type of design you want. This may be positive and negative spaces. Might be following the sap wood or a pierced rim. What ever your thoughts take.
6. Connect the air to the piercing tool.
7. Turn on the lights and fan.
8. Turn on the piercing tool.
9. Remember where your hands and fingers are. Keep them out of the way of the bur.
10. Put on the magnifying visor.
11. Pierce your first hole. Start away from the line and work back towards it, then return back to the starting point. Cut in a clockwise direction. Make the shape a free form like an Amoeba. Remember to maintain the piercing tool perpendicular to the wood surface.
12. Clean the hole by going counter clockwise.
13. Cut the next hole. Start away from the last hole and work back toward the last hole. Complete the hole by returning to the starting point.
14. Over lap the cuts in a pattern kind of like a brick wall.
15. Continue until finished or your eyes get tired. If tired take a short break and come back to it later.
16. When finished you need to sand, 400 grit, to remove pencil and scorch marks. Sand both sides
17. Finish as desired.
18. Critique your work to help you improve on the next piece.