

Apple Valley Woodturners Quarterly Newsletter, 1st Qtr 2021

AAW Chapter in Winchester, Virginia



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President's Message:

Greetings AVW Club Members, We hope you're doing well and enjoying the spring warming trend in our area weather. Here's hoping that's at least one indication of encouragement in the weeks ahead. Right from the top I want to mention that our club's board continues to monitor the evolving situation with Covid in our region to help plan our activities. At present we'll continue our virtual meetings on the third Saturday through April, May and most likely June. Please keep in mind we're committed to safe practices to ensure the health of our members. This requires us to follow the applicable official guidance and coordinate with our location host. We're all eager to meet in person again and hoping we could resume Skills Nights with small groups; but for now we're unable to confidently practice all recommended guidelines within our current space. We'll provide all members an update when we have something to pass along.



Our recent meetings have provided informative and creative topics and demonstrations by several of our own club members. We're continuing to request your inputs on the projects and techniques you want to see. We also know there are a variety of areas we can cover with demonstrators from within our membership. Please consider stepping up to show some of your favorites. We've got a range of interests, skill levels and creative ideas across our membership and within other clubs in our region, so we want to hear from you soon! Remember as well that we all benefit from regularly reviewing the basics. I personally learn multiple tips, techniques and ideas every time we meet, especially when we conduct our virtual shop tours. I encourage everyone to keep the ideas coming!

One last item for this month is unfortunately a very sad note I'm compelled to pass to our members. Mrs. Jeannette Lion, wife of our club's recent past president, Paul, passed away on December 24, 2020. Services were held in early January of this year. I'm certain that long-time club members who have known the Lion family may already be aware, but I wanted to ensure our current membership knows as well. I first met Jeannette when searching for sawmill services a few years ago, and she encouraged me to attend a club meeting. I've been doing so ever since. Paul and Jeannette were a team. We can all agree they generously gave their time and energy to help us share our woodturning and related interests through their service and friendship.

We look forward to seeing you at our virtual meeting this month and wish you the best as we press ahead with spring! Happy turning everyone!

Sincerely, Gene Lockhart, AVW President

Editor's Notes

With an article on the Morse Taper, another on vacuum chucks, and mention of a home made steady-rest; this newsletter has a focus on tooling. The Morse Taper is something a turner may never think about unless multiple lathes are being used, or something has to be bought. Vacuum chucks provide additional potential for working another way. The steady rest is a necessity for tall hollow forms. I think the tools focus is a good thing, even though it was unintentional. The tools in our craft, whether turning tools, chucks, or even the lathe itself, are essential components in turning. Good tools are required to produce a good product.



I personally am very fond of tools, and since joining this club I have learned the importance of appropriateness. Without the right methods for attaching your work-piece or properly reattaching to the lathe, a turner can be significantly handicapped. The tools are important in developing the necessary techniques and skills to get your turnings where you want them to be.

I hope you take time to read the articles and that they in some way inspire you to move forward in directions that you were only imagining before.

Walt Weidman, AVW Newsletter Editor

Club Business:

- Dues – Dues for 2021 are due. \$30 per individual and \$35 per family. Send dues to Terry Fox.
- All Apple Valley Woodturner officer positions are filled with the exception of the **Website Director**. This is a vital position for the club for not only club information, but also as a first impression that potential club members will get of the club. We desperately need a volunteer that can support us as the Website Director to maintain this vital function and keep our information current. Please let Gene Lockhart or Dennis Dantro know of your interest in helping keep the website up.
- Covid-19 - The AVW meetings in April and May will be held via Zoom platform. If weather permits and COVID restrictions allow it, we will have our skills night on June 5th at 10:00 AM at the church on the patio. The same is true for our Monthly meeting on June 19th at 9:00 AM.
- For recent new members who have not previously joined us in person, our monthly meetings are normally scheduled for the third Saturday of each month at the Welltown United Methodist Church, 1444 Welltown Road, Clearbrook, VA.

January 2021 Show and Tell

Steve Halliday: Spalted birch goblet finished with friction polish.



Steve Halliday: Home-made steady rest. The circle is made from 3/4" plywood with other portions made from red oak. The circle is approximately 12" in diameter. The 3 supports with roller blade wheels are 6 1/2" long.



Steve Halliday: Spalted birch snowman finished with friction polish.



February 2021 Show and Tell

Dennis Dantro: Black walnut bowls; top one with orange epoxy inlay and bits of chopped CD plastic, finished with high gloss poly. Bottom bowl is white epoxy inlay with satin gloss clear coat.



Steve Halliday: Box Elder bowl finished with friction polish.



Steve Halliday: Maple bowl finished with walnut oil.



Tony De Masi: Curly maple bowl (9" X 2 1/2") with rim embellishment.



Steve Halliday: Essential Workers pens, the blanks for the pens for came from DropAnchorCreations.com



Terry Fox: Sycamore bowl, 9" dia. x 2" deep, turned, textured, dyed, gold acrylic paint and spray lacquer.



Terry Fox: Walnut bowl, 6" dia. x 3" deep, turned, carved, walnut oil finish and spray lacquer.



March 2021 Show and Tell

Steve Halliday: Cherry bowl, finished with Mahoney's Walnut Oil.



Steve Halliday: Lidded box turned from Ambrosia Maple with an African Blackwood finial. The finish is Hampshire sheen (wax) with black wax on the embellished ring.



Terry Fox: March demonstration piece - lamination of Padauk and Box Elder with various dyed veneers. Candlestick was turned on two offset parallel axes. No finish.



Terry Fox: Repaired Roman jar. Made from hollow formed Sycamore, 10" tall and 4" diameter. Pierced, pyrographed patterns and lines, air brushed burnt umber, then spray lacquer. (Burnt umber is black and red with some yellow)



The Morse Taper

By Dennis J. Dantro

A brief history - Stephen A. Morse invented the Morse taper in 1864. He was an enterprising mechanic, who developed it to reliably join two rotating machine components. During 1864 Morse developed a new and better way to drill a hole using a twist drill. He saw that machine operators needed a better way to mount tool bits quickly and efficiently.



Stephen A. Morse

For example, a lathe has a rotating spindle in its headstock, to which a person may mount a spur drive in a collet. Another example is a drill press, to which an operator may mount a bit directly, or by using a drill chuck. Virtually all milling machines from the oldest manual machines up to the latest modern machines use tooling that is guided on a tapered surface.

In 1864, with a new patent and a \$30,000 financial investment, Mr. Morse opened the Morse Twist Drill and Machine Company of New Bedford Massachusetts. Recognizing the need for a way to drive his twist drill, he created a tapered shank series commonly known as “Morse Tapers”.

The mechanical advantage –The Morse taper (MT) is also known as the “machine taper”. It is a simple, low-cost, highly repeatable and versatile tool mounting system. The

underlying significant value of the Morse taper is that of a male cone mating with a female cone. The trunnion, which is the male portion, mates to the bore which is the female portion. Both are uniformly tapered for a certain length.

For light loads such as those in a lathe tailstock, tools are simply slipped into the spindle. The pressure of the spindle against the workpiece drives the tapered shank tightly into the tapered hole. The friction across the entire surface area of the interface provides a large amount of torque transmission. No keys or splines are needed.

It is important to take care when handling Morse and Jacobs tapers as they are sensitive to nicks, dents, chips and dirt. When aligning the male conical taper with the female socket, if there are any imperfections or dirt, the pieces won't locate accurately nor hold reliably. This will lead to potential wobble and chatter of the workpiece. Tapered shanks and sockets can easily be wiped clean.

The science behind the Morse Taper – Morse tapers come in 2 groups: self-holding and self-releasing. In the first group self-holding tapers, the male and female wedge together and bind to each other to the extent that the forces of drilling can be resisted without the need of a drawbar. The tool will stay in the spindle when idle. It is driven out with a wedge or plunger when a tool change is needed. Morse and Jacobs tapers are an example of the self-holding taper. In the second group self-releasing tapers, the male shank will not stick in the female bore unless using a drawbar to hold it securely there. With good drawbar force it is very solidly immobile. A drawbar is a clamping mechanism that securely holds a toolholder in place. The toolholder has the Morse taper and applies force to the spindle.



Measuring the Morse taper

Types of tapers - The Morse taper has evolved over the years and has been adopted as a standard by numerous world organizations including the International Organization for Standardization (ISO) and the German Institute for Standardization (DIN). It is the most widely used and is particularly common on the shank of taper-shank twist drills and machine reamers.

It is used in the spindles of industrial drill presses and in the tailstocks of lathes. The taper angle of the Morse taper varies somewhat with size but is typically 1.49 degrees (around 3 degrees included). Morse tapers come in eight common sizes identified by whole numbers between 0 and 7. Stub (short) versions have the same taper angle but are usually half the length. They use the whole number sizes from 1 through 3. The remaining numbers 4, 5, 6 and 7 are used for larger industrial machines.

How do you determine the MT? - To determine the Morse Taper size of your lathe's head stock or tail stock, you must accurately measure the shank of an existing drive center or tail center. You must measure three dimensions; the large diameter, the small diameter and the length of the shank. Using vernier calipers with a digital readout is the best approach.



Measuring the Morse taper

If you don't have an existing center or drive then measure the opening of the Morse taper on the head

stock and tail stock of the lathe. With this information you simply match up with the following chart to determine the MT size. Knowing the correct MT allows for the use of the correct miscellaneous accessories.

Most wood turning lathes use the same MT in both the head stock and tail stock. But be sure to measure both. There are lathes with other sizes of Morse tapers, but the sizes 1, 2 & 3 are the most typical sizes for common woodworking lathes. Machining and industrial lathes use larger MT sizes.

Table of Morse Tapers:

Morse Taper #	Large Dia	Small Dia	Length
0	.356	.252	1.938
1	.475	.369	2.063
2	.700	.572	2.500
3	.938	.778	3.063
4	1.231	1.020	3.875
4-1/2	1.500	1.266	4.313
5	1.748	1.475	4.938
6	2.494	2.116	7.000
7	3.270	2.750	9.500

Keep it clean, it's important to keep both the bore and the spindle of any Morse taper tooling clean and in good condition. Keep them free of wood debris, gummy pitch, rust and tarnish. Smooth any nicks, dents or burrs you see or feel. Do not lubricate or wax a Morse taper unless you plan to store it long term to lessen the chance of rusting. It is important to keep the mating surfaces clean and smooth.

Going high tech – In the mid 1970's the Morse taper idea jumped from the design and

manufacture of metal cutting tools to orthopedic surgery when the ceramic head was introduced in hip replacement surgery. In the beginning, the fixation of the alumina ball onto the metal stem was done with glue then screwed into place. This created the potential for separation of the ball from the stem resulting in fractures. Eventually the ball head fixation problem was solved. In 1974 Prof. Mittelmeier adapted the Morse taper for ceramic heads. The result was a success with a large decrease in ball head / stem fractures.



A hip implant using MT fixation

Similarly, some dental implants use a Morse Taper to connect components.



A dental implant using MT fixation

Credits:

Wikipedia, the free encyclopedia, 2021

Zoro.com, 2020

One hundred and fifty years of history of the Morse taper:International Orthopedics. 2013.

Highland Woodworking, 2019

San Bernardino Family Dental, 2021

Vacuum Chuck System – How I Built Mine

By Steve Schlumpf, Michigan Turner

While there is a lot of information on the subject of vacuum systems that can be located on the various forums, not many walk you through the process of putting one together. I researched vacuum systems, read every post I could on the subject and tried to get an idea of what it would take to put together an affordable system. While I am sure there are many different ways to construct a vacuum system, here is a simple system that works and cost less than \$200.

The normal disclaimer: I have learned what I know through active participation here on SawMill Creek and trial and error. The following photos offer only a few of the many possible ways to hook up a vacuum system. Most importantly, if something doesn't look or 'feel' safe to you – **DON'T do it!**

At this point I want to give credit to two folks who helped make my vacuum system become a reality: Vaughn McMillan, (familywoodworking.org) from whom I borrowed the design of the cart. Tom Steyer, (sawmillcreek.org) who not only listed and sourced the individual components I needed but designed and built a custom rotary adapter to fit my Jet 1642 lathe. Thanks Tom! Without your detailed assistance my vacuum system would still be in the research stage! Tom makes adapters for several popular lathe models. You can contact Tom at vacuumadapters@cox.net or through Sawmill Creek.

The following items were obtained from Surplus Center (www.surpluscenter.com):

Description; Item No.; Qty

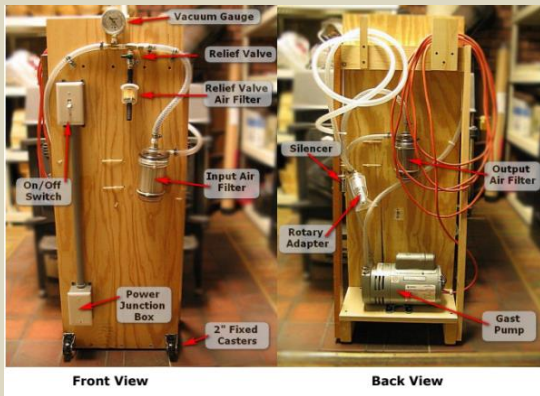
- Gast 0523 220VAC Vacuum Pump; 4-1540; 1
- Air Filter; 4-1565; 2
- Vacuum Gauge; 21-1583-CA; 1
- 1/4" NPT Brass Ball Valve; 20-1486; 1
- 1/8" NPT Air Silencer; 4-1657; 1
- Bushing 1/4"x1/8" NPTF; 455-HH; 1

The following items were obtained from Menards:

- 3/8" ID x 20' Vinyl Tubing; 6840442; 1
- 1/2" ID x 10' Vinyl Tubing; 6840455; 1
- 1/4" NPT x 3/8" ID Hose Barb; 6801821; 7
- 3/8" NPT x 1/2" ID Hose Barb; 6801847; 2
- 3/8" x 1/4" Brass Adapter; 6805940; 2
- 1/4" Brass Elbow; 6805827; 1
- 1/4" Brass T - Female Threads; 6805115; 2
- 1/4" NPT Brass Barrel; ?; 1
- 9/16" to 1" Hose Clamps; ?; 10
- 20A/250V Standard Plug; 3635362; 1
- 20A Double Pole Switch; 3637535; 1
- 20A/250V Single Receptacle; 3638974; 1
- 2" Rigid Casters; 2171995; 2

I also picked up a Fram G2 fuel filter from Wal-Mart for less than \$3. It's used as a small air filter for the relief valve. There are a few other parts such as junction boxes, PVC conduit, outlet covers, etc. that you can pick up at your local home improvement store as needed.

I wanted the vacuum system to be portable so that when finished using it I could store it out of the way of my lathe. I modified Vaughn's idea of a cart/ hand truck and used scrap pieces of lumber I had on hand. I am sure with a little thought and planning you can come up with something that fits your needs.



Building the System

I installed the Gast pump such that the input/output were oriented to the left which placed the pump wiring close to the wall of the cart and out of the way. The pump was mounted to the 3/4" plywood using 1/4" bolts and lock washers so it wouldn't vibrate loose.

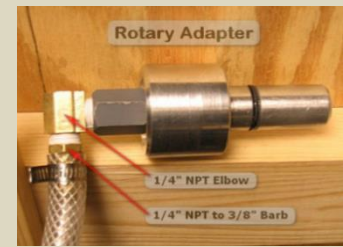
On the front side I installed a junction box (for power) at the location I wanted the pump wires to come through the wall. A 3/4" hole was drilled through the junction box and plywood wall for the wiring. A second junction box (for the on/ off switch) was then installed directly above the power box. I installed a short piece of 1/2" PVC conduit that I just happened to have left over from installing the 220 VAC drop for my lathe.

Power

For the power hookup I used pieces of an old 50' 16-3 outdoor extension cord. I cut a piece about 12' long and installed the 220V standard plug on one end and routed the other end through the pump side of the wall and into the power junction box. From there I threaded it through the conduit and into the on/ off switch box. A 3' piece of the extension cord was then run from the on/ off switch box back through the conduit and into the power junction box.

The on/off switch (220 VAC double pole/ single throw) was then wired with the long power cord connected to the input side of the switch

and the short 3' piece connected to the output side of the switch. I pulled all the excess wiring back down into the power junction box, installed the switch in the box, and attached the cover plate.



Next, using wire nuts, I wired the Gast pump to the 3' piece of orange extension cord. I made sure all the connections were secure - then installed the cover. If you have to ask how to wire the pump to a 220 VAC line – PLEASE get someone qualified to make the connection for you! While I have no problems showing you how to make point to point connections on the VAC lines (worse that can happen is you lose vacuum), if you hook up the 220 VAC wrong and it could get serious!

Plumbing

This is where the fun begins as there are any number of ways you can route the vacuum lines. A simple overview of what we are going to do; connect the lathe to the vacuum pump, provide a filter to keep the wood dust out of the pump, install a gauge to monitor the vacuum and provide a means to regulate that vacuum.

Starting at the lathe we have to use a special vacuum chuck. These need to be different sizes and can be either bought or made in your shop. I will give an example later of a simple homemade chuck that works great.

In addition to the pump you need an adapter that provides a means to attach the vacuum hose to the spindle. There are a number of adapters out there that fit different lathes. I decided to go with the adapter Tom Steyer designed as it allows me to just plug it into the handwheel without having to bolt it on or buy yet another threaded adapter. I also love the

fact that when I am done using the vacuum system I simply pull the adapter from the handwheel and wheel the vacuum system away!

Step 1: Connect the rotary adapter to the input air filter using the 3/8" ID vinyl tubing. I used about 4' of tubing but the amount is up to you. Remember to use pipe tape for all your threaded connections! I installed a 1/4" NPT elbow at the adapter in order to route the vinyl tube away from the lathe. I then connected a 1/4" to 3/8" barb to that elbow so I could connect the vinyl tubing.



The air filter has a 1/4" NPT input connection but a 1/2" output barb – don't ask me why they are different cause I don't know. I installed a 1/4" to 3/8" barb on the input and slid on the vinyl tubing. I actually used a hair dryer to warm the vinyl tube before sliding it on the barb and it helped a lot! I then secured both tube connections with small hose clamps.

Step 2: Secure the air filter to the 3/8" plywood wall. I figured where I wanted the filter and drilled a few holes through the plywood and held the filter in place with tie-wraps. Real Hi-Tech!

Step 3: Connect the output of the air filter to the vacuum relief valve. The output barb of the filter is for



1/2" ID tubing. I heated the end of the 1/2 vinyl tubing, pushed it on the barb and secured it with a hose clamp. I then moved the tubing around until I found an area I wanted to place

the relief valve and vacuum gauge. I cut the tubing at that length leaving just a little extra.

Step 4: Connecting the 1/2" tube to the rest of the system required an adapter that went from a 1/2" barb to 3/8" NPT. Then an adapter that went from 3/8" NPT to 1/4" NPT. The 1/4" NPT threaded into one end of the first 1/4" "T".



Step 5: Connect the Relief Valve to the "T" and then attach the small air filter to the bottom end of the Relief Valve. The small air filter is to prevent dust from entering the system when regulating the vacuum. I also used the 1/4" rubber hoses that came with the filter – just because they look really cool!



Step 6: Connect the 1/4" barrel to the "T" and then connect to the remaining 1/4" "T". Attach the Vacuum Gauge as shown and then attach another 1/4" NPT to 3/8" barb so you can connect to the 3/8" ID vinyl tubing.

Step 7: Run a length of tubing from the 1/4" "T" to the input of the pump. The input and outputs of the pump are labeled on that end of the pump. Cut the tubing to length and install a 1/4" to 3/8" barb into the pump. MAKE sure you attach the 3/8" vinyl tube to the input side. Secure with a small hose clamp.

Step 8: You are going to connect some 3/8 ID tubing to the output of the pump but first you must figure out where you want the output air filter located. Drill a few holes and secure the output filter with tie-wraps.

Step 9: Install a 1/4" NPT to 3/8" Barb to the output side of the pump and another one to

the input of the air filter. Cut a piece of 3/8" ID vinyl tubing to length and install between the pump and air filter. Secure with hose clamps.

Step 10: Determine a location for the silencer and attach to the structure. Connect the output air filter to the silencer using 1/2" ID vinyl tubing and adapters as listed in photo. At this point the construction of the vacuum system is complete. All you need now is a vacuum chuck!

Making your own vacuum chuck

The following is a simple vacuum chuck and is only one example of some of the materials you can use for chucks.

Step 1: The wood is rough cut cherry approximately 1" thick and the PVC is a 4" coupler. I surfaced one side of the cherry, cut the piece in half and glued the pieces together using Elmer's Ultimate High Performance Glue. It's one of those glues where you wet the surface of both pieces of wood, spread the glue and then clamp it overnight. The glue expands and fills all the small areas between the two boards that could potentially cause a vacuum leak.



Step 2: You can use a faceplate to mount the vacuum chuck to your lathe, but I use the Beall Spindle Tap and will show how I use it to make my own faceplates. Mount the glued up wood between centers and round the outside such that it can fit into the jaws of your chuck. I have a Talon chuck



and use the larger #3 jaws to hold the blank for the next step.

The outside is now rounded over.



Step 3: Mount the blank in your chuck and bore a hole 1/8" less than the finished tap size – meaning 1/8" less than the size of your spindle. In my case I drilled a



1 1/8" hole all the way through the blank. There is enough room for the Forstner bit to clear the chuck once it cuts through the blank – however – it is a good idea to watch closely and not ruin your drill bit!

Step 4: Following the instructions for the Beall Spindle Tap, I start the tap into the wood and have the back of the tap supported with the tailstock. The spindle of the lathe is locked so that the blank cannot move. I use a crescent wrench to turn the tap 1/2 turn and then snug up the tailstock center. Repeat until the tap is fully inside the wood and the tailstock is no longer needed to help keep the tap traveling straight. Tap the wood all the way through. Unlock the spindle!

Step 5: Remove the blank from the chuck and then remove the chuck from the lathe. Thread the blank onto the spindle and true up both faces of the blank.



Step 6: The idea here is to turn a shoulder area that will support the PVC



coupler. You want to make this a fairly snug fit and should take your time when you get close to the final size. I dry fit the PVC often until it makes contact on the shoulder as well as the inner tenon area. Once I have a good dry fit I clean up the shoulder area with a parting tool – just to make sure I have a good 90° angle between the shoulder and the inner tenon.

Note: make sure the PVC is clean and it's edges are smooth so as to make good physical contact with the wooden faceplate.

Step 7: Glue the PVC coupler and the wooden faceplate together. I use hot melt glue and find it works very well. I run a bead of glue along the shoulder/ tenon junction and then seat the coupler while the glue is still hot. I then run a bead of glue along the inside of the chuck at the PVC – wood joint and also along the outside joint. The glue cures very fast but I usually let them sit for an hour or so before returning the chuck to the lathe.



Step 8: With the chuck mounted on the lathe, use a bowl gouge and true up the PVC and round the edge over. Use sandpaper to clean up any tool marks. Also, I highly recommend the use of a closed cell foam gasket on the rim of the chuck to help provide a good seal and protect the turning. Any number of different closed cell materials can be used.



You can find 1/8" craft foam (with self-adhesive back) at Hobby Lobby, Michael's, and other craft stores. Use white or light colors to avoid possible stains on your work.

Congrats – you just made your own vacuum chuck!

Apple Valley Woodturners Dewalt tool kit loan program

DeWalt Corporation

awarded AVW a wood working grant for 2 tool kits to be used by club members. Any member of the club may borrow a complete tool kit at any time for any wood working project.



The goal: There is an apparent danger in using power tools aka: high speeds, torque, rotating blades, sharp edges, etc. The goal of DeWalt Corp. and Apple Valley Woodturners is to improve and increase the knowledge, skills and confidence needed to use power tools. AVW's participation will help strengthen our local wood working community and members of the club.

Contents: Each 20 volt battery operated compact tool kit contains 8 pieces: one carrying case, one circular saw, one variable speed drill, one impact driver, one flashlight, two 20 volt batteries and one battery charger.

Scope of the AVW program: The tool kit may be borrowed for up to 30 days. Mentoring is available.

To borrow the DeWalt toolkit: Contact any board member by email:

Dennis J. Dantro at dennisjdantro@gmail.com

Gene Lockhart at genelockhart16@gmail.com

Terry Fox at tfox1042@yahoo.com

Stipulations:

- The borrower must be a member of the club.
- A short project description and time frame is requested.
- The borrower must have personal liability insurance.

Our Sponsors:



<http://www.mcfarlandsmill.com/>

587 Round Hill Road, Winchester, VA 22602

Phone: (540) 667-2272

FAX: (540) 722-6261

Hours: Mon-Fri 7:00-3:30; Thu 7:00-6:00; Sat 8:00-1:00

We all know and appreciate what McFarland's Mill does for our club. Please stop by to thank them for their help and, even better, purchase your turning supplies from them to support them for supporting us! Stephanie and Robert would appreciate your patronage, for sure.

In case you don't already know, they carry a variety of items from the Rockler catalog and, if they do not have something in stock, they will order it for you (sale prices, discounts, and specials apply) and you will not have to pay for shipping... a good deal! Contact Stephanie by phone or email...

mcfarlandsmill@comcast.net



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Hours: Mon-Fri 8:00-4:30; First/Last Sat each month 9:00-1:00

Exotic Lumber operates as a specialty lumber yard with two operations to serve the Washington/Baltimore area. We ship lumber to customers throughout the United States and, with over 130 species in stock, we have one of the widest selections of lumber available on the East Coast. Our customers include cabinet makers, furniture makers, millwork shops, boat builders, woodturners, etc. We have no minimums - purchase 1 board or 1000bf. Have a look through our website as we constantly upload new images... email us, phone us or visit us at either our Annapolis or Frederick warehouses where you are most welcome to select your own lumber. You can also find us on Facebook! Show your AVW Membership Card to receive a 10% discount!



<https://nilesbottlestoppers.com/>

(717) 486-5232

Niles Bottle Stoppers supplies turning items for bottle stoppers and openers. There are additional items as well that assist in the project, or hardware for completing various turned kitchen objects.



<https://www.starbond.com/>

(800) 900-4583

Starbond glue comes in several consistencies for varying applications. Their website details the projects you can get from them as well as instructional information on how to make your project better.



<https://www.packardwoodworks.com/>

(800) 683-8876

Packard Woodworks is a contact and supplier for seven different Lathe brands. Additionally they supply woodworking support items ranging from turning to wood burning and carving.