

# 20 steps to turning better pens

Expert pen turner **Kurt Hertzog** shares his top hints, tips and techniques and shows you how you can produce the best turned pens in no time at all

**T**his article on 20 steps to better pens is a primer on simple techniques that can help improve your pen turning results. There is not sufficient space here to cover these points exhaustively, but there is enough explanation to help you understand why these items are important and the part they can play in improving results. While the 7mm ( $\frac{1}{2}$ in) kit is used as an example, many of these concepts will also apply to the various other kit styles and freestyle pens. These 20 items are certainly not all-inclusive but do cover the most important, most easily implemented to help with your journey in pen turning.

## FURTHER READING

To see a full list of US and UK pen kit and accessory suppliers, visit the Woodworkers Institute ([www.woodworkersinstitute.com](http://www.woodworkersinstitute.com)) and search for this article

## KURT HERTZOG



**About the author:** A professional woodturner, demonstrator and teacher, Kurt enjoys the continuum of woodturning from making his own turning tools to photographing his finished turnings. Kurt is a regular feature columnist for *Woodturning Design* magazine, one of the five Council Members of the Pen

Makers Guild, and a member of the Board of Directors of the American Association of Woodturners (AAW). His work has been featured in the American Association of Woodturners 'Rounding The Corners' Exhibit and published in *Woodturning Design*, *American Woodturner*, *Pen World*, and *Stylus* magazines.

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**TIP 1 – START WITH QUALITY COMPONENTS**

The best way to end up with a quality result is to start with quality materials. If your pen is intended for practice, or perhaps you intend to sell it at a local craft fair, then you can use less expensive kits for economy.

When creating a gift or a for sale item in the higher end market, you must start with a kit with highest quality components. Do not confuse paying a high price with getting high quality. You can pay too much for anything you purchase. Buy quality kits and components at your

best price knowing the meaningful quality differences between the various styles, manufacturers, and retailers. The cost of the kit is a small price considering the value of your time added to the final result. The other major component is your blank. A cutting from a piece of walnut (*juglans regia*) may be in order for practice, but a sharp looking blank will be much more desirable as a gift or in the marketplace. A stabilised, highly figured blank will usually be worth the investment



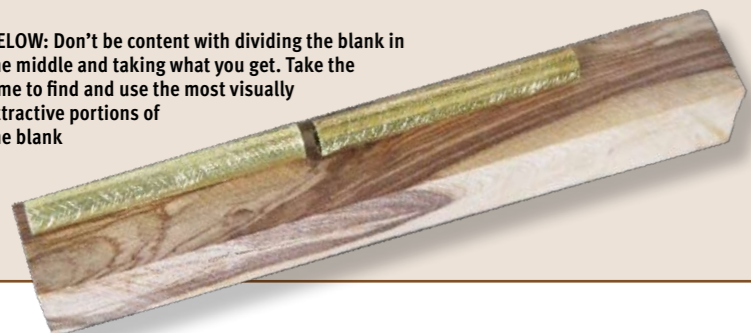
ABOVE: Getting to a quality end point requires that you start with quality components. Use the best and most durable components that you can find

**TIP 2 – USE THE MOST INTERESTING PART OF THE BLANK**

Do not simply divide the blank in half and be content with what you end up with. Regardless of your selected material for the blank, there often is an interesting portion of the blank and part of lesser interest. Search for and use the most interesting part of the blank to help make your final result

more appealing. The nib end of your pen will get the most visibility. Plan your layout and process accordingly, so that the most stunning part of the blank material will wind up there. You may put the less interesting portion – or a flawed area – of the blank under the clip since it gets much less attention than the nib

BELOW: Don't be content with dividing the blank in the middle and taking what you get. Take the time to find and use the most visually attractive portions of the blank



**TIP 4 – DRILL THE BLANK FROM THE INSIDE OUT**

You've gone to the trouble of minimising the kerf and planning for grain match between the top and bottom pieces. Drilling haphazardly, without accounting for the interface, will not help with your grain alignment. Mark your drill centres on the interface ends of your blank halves, then drill from those ends. The variation in the grain match from any drill centre error should be minimal. If you drill from the other end of the blank, you stand far greater chance of visual mismatch. While it may seem obvious, many don't mechanically mark the centres of the blank for drilling. A centre punch mark, whether by hand with a prick punch or a spring loaded centre punch, will help the drill start drilling exactly where you wish with much less opportunity to wander at the start of the drilling

ABOVE: By locating, physically marking, and drilling from the interface ends of the pen blanks, you can minimise any potential grain mismatch

**TIP 3 – MARK THE INTERFACE, MINIMISE THE KERF**

RIGHT: Mark you blank so that you'll easily know which ends of the blanks meet in the middle. Subsequent processing keeping these ends in mind will help maintain grain match at the interface

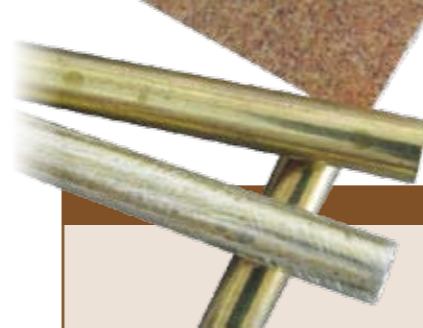
Once you have achieved the best visual layout, take the opportunity to mark the cut line on the blank and also indicate the proper orientation of the interface ends for your subsequent processing. You will need to know which ends are the top-to-bottom interface as you continue. This will ensure the best grain match possible as you continue your work. You may want to adopt this marking procedure as a standard practice even when the blank material doesn't require it, thus becoming a habit for you. It takes little effort and will make a visible difference in your final pen. I also recommend marking the interface ends of the tubes after facing the glued-up blanks. This will help your orientation, since the outside marks on the surface of the blank material will disappear as you begin turning material away



**TIP 5 – DRILL PROPERLY**

BELOW: Proper drilling technique will yield quality size and surface for the adhesive bond. Excessive force or speed will melt and cause dimensional variation or polish the inside of the hole reducing adhesion

Drilling a hole may seem basic and can be thoughtlessly done. Drilling properly is crucial to achieving a quality hole. The selection of drill type is far less important than drill sharpness and drilling technique. A hand held drill will work, but a drill press – or your lathe – will provide more control and usually a better result. With a sharp drill, the speed and feed will dictate the final hole quality. Remember that all materials drill differently. Proper drilling technique requires not only using correct rpm and drilling



ABOVE: Scuffing the tubes with a coarse abrasive will create a mechanical 'tooth' free from lubrication residue and oxidation. These clean and irregular surfaces help the adhesive bond

**TIP 6 – SCUFF THE TUBES FOR BETTER ADHESION**

Brass tubing is drawn through a die in the manufacturing process. A lubricant is used to facilitate the process and maximise the life of the drawing die. You can't feel the residue on the tube from the drawing lubrication, but it is there. The bond that the adhesive makes will be to the lubrication residue, any surface oxidation,

and then maybe poorly to the brass tube. I recommend that you scuff the brass tubes with a coarse abrasive to give the tube some 'tooth.' The freshly cut surfaces provide areas free of lube residue and oxidation. These clean mechanical irregularities on the tube surface allow for a good bond of the adhesive

**TIP 7 – USE COMPLIANT ADHESIVE**

You can use many different adhesives to bond your brass tube to the inside of your blank. Cyanoacrylate, epoxy, and polyurethane adhesive are the most widely used types. There are advocates of each type and even various brand names. I use polyurethane adhesive. I believe it provides a secure but more compliant bond than the other types of adhesives. Over the life of your pen, it will see many different environments with changing temperature and humidity. The brass tube will be unchanged, but the wood cladding around the tube will change considerably by

comparison as it absorbs and gives up moisture. If the wood is expanding and contracting and the brass tube isn't moving, any rigidity in the adhesive only enhances the potential for splitting the wood. The compliance in your adhesive provides a bit of 'give' to reduce the likelihood of cracking. The potential for cracking is dependent on many things including species of wood, final thickness of the wood layer, clearance of the drilled hole, rates of change and extremes in environment. Millions of pens have been made successfully with all of the different types of adhesives. I have used all of the types of adhesive with success, but whenever possible, I select and use polyurethane adhesive. I favour it for the long-term flexibility and compliance it provides

LEFT: There is a wide range of adhesives to choose from with advocates for each type. I favour polyurethane adhesive for good bonding strength yet compliance



most of the adhesive used will be wiped away as you insert the tube. Don't accept the size that is stamped on the drill as being accurate. Use your dial callipers and compare the drill diameter to the brass tube diameter. I often drill a test hole of the same material – the excess material that you cut off the blank is a good source – and test the fit with the tubes intended for use. That test drilling will help verify the hole size after drilling, also helping to select the best speed and feed. Every material drills a bit differently and presents a slightly different finished hole. You will notice this variation depending on the material, e.g., density of the woods, type of plastics, and antler or bone

**TIP 8 – USE THE MATCHING CUT ENDS WHEN GLUING**

When you glue your tubes into the drilled blanks, you will have left a bit of material at both ends to allow for facing the blanks. The tendency is to apply adhesive to the brass tubes and insert them into the blanks, simply making sure there is overhanging material at both ends. You can assist yourself greatly by inserting your tube from the interface end of each blank and only inserting the tube to just below the surface edge of the blank. Leaving sufficient material to allow for facing is important, but make it minimal. The amount of material removed during facing will have an impact on the final result. If you are making a kit and intend to use the centreband, plan on the materials removed – facing on both blanks plus the width of the kerf – to equal the centreband width for the best appearance of grain match. In creating a 'centrebandless' kit, any kerf and facing loss at the interface degrades the grain match, so strive to keep loss at the absolute minimum



ABOVE: Use the matching cut ends when gluing in your brass tubes. To preserve grain match, keep the tubes as close to the surface as possible allowing for proper facing with minimal material removal



**TIP 9 – PILOT ON THE TUBE WHEN FACING THE BLANK**

At this stage of the process, the excess blank material needs to be removed and the ends of the brass tubes exposed just flush with the blank. While there are several ways to accomplish this, I recommend using a pen mill. This tool will remove the wood while piloting on the inner diameter of the brass tube. If your facing method doesn't pilot on the tube, using an unpiloted sander setup

for example, you won't achieve the most perpendicular facing. Any error in the facing can show up in the final assembled pen. Pen mills are modestly priced and are a tool that I believe should be in every pen turner's kit. The pen mill can be used in a hand drill, drill press, or lathe. For facing, I use it in the drill press so I can easily control the force while accurately piloting on the inner diameter of the tube. Remove only

enough material to expose the end of the brass tube to make it flush with the surrounding material of the blank. Removing any more than a minimal bit of the tube length may adversely affect the grain match and the overall assembly



ABOVE: Facing the blanks should expose the tube just flush with the blank. Piloting on the inner diameter of the tube will provide the most perpendicular surface during the facing process

**TIP 10 – USE MINIMAL TAILSTOCK PRESSURE**

If you aren't using a mandrel saver, use only enough tailstock pressure to hold the end of the mandrel in place for rotation. It is a very common error to use excessive tailstock pressure. An incompatible tip angle on the live centre often causes problems with fit into the mandrel end, so the user increases the tailstock pressure to overcome this improper fit. Too much tailcentre pressure will cause the mandrel shaft to flex, and the turned

parts will be eccentric. This flex will occur throughout the turning, sanding, and finishing stages. The final result is the poor fit most noticed at the critical nib end of the pen. The turned blank fits perfectly for part of the rotation but is proud or undersized at another point of the rotation. Since the turned blank isn't round, it obviously can't mate up properly with the nib, which is round within a much tighter tolerance. Any excessive tailstock pressure can also permanently bend the mandrel shaft of the pen. Straightening the shaft is rarely successful. The best solution when this occurs is replacement of the entire mandrel shaft

LEFT: The points on tailcentres vary in tip angle. This potential mismatch with the mandrel end encourages the user to use excessive force on the tailcentre to compensate



**TIP 11 – USE SHARP TOOLS**

You can use almost any woodturning tool to turn a pen. Regardless of your selection, your tool needs to be sharp. Dull tools will force you to push on the material rather than present the cutting edge lightly and have the tool do the work. The pushing force causes flex in the mandrel, in turn causing eccentric parts. A more common result of using a tool that isn't sharp: forcing you to use your cutting tool more as a scraping tool, since it won't cut properly. While you can get the tool to remove wood, it is in a less desirable manner requiring more sanding. Select the tool of your choice, make certain that it is sharp, run the speed as fast as is safe, and use proper cutting techniques for light but clean cutting. Rely on the tool to do the cutting you desire rather than using additional sanding to cover up for poor turning



ABOVE: Almost any turning tool will work nicely for turning pens. As with any turning project, sharpness and technique is required to achieve a quality result

**TIP 12 – MEASURE YOUR FIT**

If you are using the bushings supplied with your mandrel or kit to turn your blank to the finished dimensions, you are not doing as well as you could. The bushings may or may not be accurate to start with and they will certainly get smaller and smaller in diameter over time as you sand your turnings. The bushings should be used to get into the ballpark quickly but not to determine the final dimension. Add a pair of dial callipers to your kit for measuring parts accurately. The callipers don't need to be expensive

or accurate for that matter. They only need to be repeatable. I measure the mating brass part and turn the wood to match that measurement. The number on the dial doesn't need to be accurate since you are using the callipers as a transfer mechanism. Whatever the number is on the dial, when the turning and the component measure the same number, the two parts match. Obviously you'll need to allow for the sanding which will reduce the dimension and finishing, which will increase the dimension. You will learn how much to allow

for those further processing steps. I recommend using the actual kit parts you intend to use when doing your measurement. Measure to determine what you need for a proper fit and then proceed with your turning, sanding, and finishing until you achieve that dimension



ABOVE: Bushings shouldn't be relied on for the final sizing of turned blanks. Use a pair of dial callipers to check the parts being used and create your turning to match those parts

**TIP 13 – SAND RADIALLY & AXIALLY**

Sanding your turned pen parts on a lathe under power is exactly the wrong way to sand. Almost all pen glue-ups are done with the grain running parallel with the brass tube and axis of the lathe. When you sand, the abrasive is cutting across the grain. This causes radial scratches that are readily visible. If you work through the grits of abrasive to your finished point, you may still have radial scratches that can be seen under close examination. A way to minimize this problem is to do axial sanding as well. Once you have completed sanding with your chosen grit, turn off the lathe, and sand axially along the grain. Rotate the lathe by hand until you've completed a complete rotation of axial sanding. Examine the blank to determine if you need to do more sanding. Once content with the results of that grit, wipe the entire blank with a clean cloth and proceed to your next grit. Wiping the blank with a cloth will remove any pieces of abrasive grit that may have separated from the backing so that they don't remain and continue to cut when you move to the next finer grit abrasive. Blowing off the blank with compressed air is not as effective as wiping it. Repeat the radial sanding, axial sanding, and wiping process until you have stepped through your abrasives until it looks and feels right



ABOVE: Use both radial and axial sanding to achieve the best results. The axial sanding on the top portion of the blank with the same grit shows how it can 'erase' the original radial scratches

**TIP 14 – CAREFULLY PREPARE FOR THE FINISHING PROCESS**

Proper preparation for the finishing process requires sanding through all of the grits to achieve a visually scratch-free surface. Any imperfections now will not go away under the finish. Blemishes and imperfections will only be highlighted once a finish is applied. In order to achieve a quality sanded surface ready for finish application, you need to follow good sanding procedures. Sanding at a low speed keeps the heat build-up to a minimum and allows the cutting edges of the abrasives to do their job. Too high a rotational speed builds up heat – the enemy of wood and the adhesive. Also, the cutting edges of the abrasive can't stay engaged to cut when you are spinning too fast. Sand radially, then axially, and work through all of the grits. There are grits between 120, 220, and 320. If you don't own 150, 180, 240, and 280 grit, you may wish to get a small quantity of each for when your material will benefit

from these intermediate abrasive steps. Depending on the material and the desired finish, you can start at the appropriate grit and work to the highest grit needed to obtain the visual appearance you desire. For materials such as plastics and hardwoods requiring super finishing, there are abrasive products such as Micro-Mesh and others to go way beyond the standard woodworking and automotive paint abrasives

BELOW: Proper preparation for applying a finish requires working through all of the grits. Slow speed to build minimal heat and allow cutting, including cleaning between grits yields quality results



**TIP 15 – APPLY A TOUGH, DURABLE FINISH**

The life of a pen is a difficult one. The leisurely life for a pen is sitting on a desk. Most pens don't enjoy such a sheltered life. They are in pockets with keys and change, bottoms of purses, dashboards and glove boxes of cars, or worse. Scratches and mechanical stress, extremes in temperature, and wild swings in humidity, are going to be the norm for a working pen. In my opinion, wax and shellac based finishes are not very durable for such a tough life. If a finish goes on too easily, chances are that it will come off or be ruptured just as easily. You will need to give your pen the most durable finish you can for it to look good, yet survive in the difficult world it will live in. My two favourite finishes, tough and durable yet applied without much difficulty, are cyanoacrylate adhesive and lacquer. Both are attractive, yet extremely tough compared to the other finishes available. You can find many different methods of creating a cyanoacrylate finish by doing a web search. Some people use boiled linseed oil in the process. Some do not. I use straight applications of

the thin viscosity version of the adhesive applying many light coats, allowing drying between coats. After I have achieved more than the desired build dimension, I use the Micro-Mesh abrasive products to bring the adhesive to a level surface and high gloss finish. When I am using lacquer as a finish, I use the same technique. Many light spray coats building to the desired dimension followed by using the Micro-Mesh abrasives for levelling and reduction to the finished dimension and gloss desired. Either the cyanoacrylate or lacquer finish will give your pen a great looking, yet extremely durable finish

BELOW: Among the many finishes available for pens, cyanoacrylate adhesive or lacquer make excellent finishes. Either can be used to create a beautiful and durable finish





**TIP 16 – ACHIEVE PERFECTION IN FITS**

As beautiful as any pen may be, it is the feel in the hand that makes it a winner, or not. If your fits, both visual and tactile, aren't perfect, the pen will feel or look awkward forever. There are many ways to achieve perfection in fits. Most happen by attention to detail during the processing. Perpendicularity in the facing process and minimal removal of brass tube are the most error prone steps. There is an easy way to achieve the perfect fit. Design and process your pen so that the nib and clip ends of the blanks are very slightly undersized when you have completed all of the steps though, and including, the final finish. When you are at the assembly phase, measure your nib – or end clip or centre band – then trim your blank by hand with the sharpest

barrel trimmer you own. With this trimming in mind, a taper in the body will allow you to cut back 'up the hill,' increasing the diameter until you reach perfection. You can't take off much or you won't have the ability to assemble properly. If, for example, your nib diameter is .332in and your finished barrel at that interface point is .330in with a gentle taper from that end, a couple of light twists of the barrel trimmer will let you tune your dimensions to the perfect fit. Using a pair of dial callipers will let you do this by trial and error. Once you've reached the desired number, put a slight chamfer on the inside edge of the brass tube and assemble those pieces. This process can be used at any location that will be felt or seen, and you want to have a perfect fit

**RIGHT:** Measuring the components and tuning the blanks to fit exactly is straightforward and easy to do with a couple of commonly used pen turning tools



**TIP 17 – USE A QUALITY INK-FILL**

Unless the pen is destined to only be an ornament on the shelf or desk and never be used for writing, use a quality inkfill. Even the higher quality kits have to watch their costs closely. The inkfill usually is the area where the manufacturers try to save money. The kits, regardless of the price point, usually are delivered with the same inkfill. It is a modestly priced component at best. A quality turned pen having an inkfill that writes poorly will disappoint. As detailed above, you should be assembling your pen using the actual inkfill that your pen will be delivered with. When I make a 7mm (1/2in) Cross style pen, I use a genuine Cross brand inkfill. I like the way it writes compared to the supplied inkfills or other brands. If you have an inkfill brand that you prefer, use that. Keep in mind that the careful tuning you did at the inkfill projection may not remain the same if the user replaces the inkfill later with a different brand. By using a quality inkfill that is readily available in the stationer's store, the end user will be able to get an exact replacement when needed. Let them know that it is important to replace it with the same inkfill. That will ensure that it remains a quality writer with the proper extension for the entire life of the pen

**RIGHT:** All of your efforts to create a fine pen can be for naught if you don't ensure that the inkfill makes it write well. I find that the quality inkfill does make a difference to the user experience



**TIP 18 – SET A DESIRABLE INK-FILL PROJECTION**

There is no magic required to make beautiful and perfect pens. It is simply paying attention to detail. The extension of the inkfill is no different. You will have a desired look in mind and achieving it is little more than care in assembly. I am not a fan of assembly presses. Most are not sturdily built or very precise. A bench vise, drill press, lathe, or hand clamp will perform admirably for assembly. Padding or a wood block to prevent marring should be used as needed, but any of these tools will easily press your parts together either to a shoulder or to a depth. I use a hand clamp with the pads removed so the component parts rest on the plastic jaw material. To achieve the desired inkfill projection at the open position,

press the transmission into the brass tube short of where it needs to be. After ensuring that the plastic threaded end cap is seated completely on the end of the inkfill, thread the inkfill into the transmission completely, twist it to the most forward position, and check the inkfill projection at the nib. With the needed additional press depth in mind, remove the inkfill and repeat the press. Perform this operation as many times as needed to creep up on the desired inkfill projection. Should you go too far, use your disassembly tools to take things apart and do them properly. Disassembly tools need not be expensive. Two short lengths of the proper diameters of drill rod and a small hammer are all that are needed

**RIGHT:** The inkfill extension, while seemingly picky, does affect the look of the pen and is an indicator of your attention to detail. Easily controlled, it is one of the items that can set your pen apart



**TIP 19 – TAKE ADVANTAGE OF PRESENTATION**

For the modest pen to be sold at the craft fair, or displayed at your local woodturning club, a plastic pouch, plastic box, or velvet bag probably will do as a delivery mechanism. In the case of a gift or higher end pen, care should be taken in the presentation. There are two points here. A leather – or simulated leather – case, quality wooden box, or special stand is in order. The case may only be used for presentation and then stored or discarded by the owner, but the impression has been made. In my opinion, quality

work demands quality presentation. The other part of this can be the home for the pen in use. A desk stand made especially for the pen is an opportunity to extend your woodturning or woodworking into a new area. Desk pens are an opportunity to really shine by personalising the stand or doing additional ornamentation. Use the presentation device to reinforce the impression of your top-shelf work

**ABOVE:** The inexpensive vinyl sleeves, velour bags, and plastic tubes may be fine for the mass produced pen but will certainly detract from the finer work. Use the presentation experience to your advantage



**TIP 20 – GET AND USE A FEW KEY TOOLS**

Most woodturners are infatuated with gadgets and tools. Making pens requires only one woodturning tool. Pick one. A spindle roughing gouge, spindle gouge, bowl gouge, parting tool, or skew chisel will do the job nicely. The myriad tools available and the gadgets peddled for pen turning, assembly, and finishing is astonishing. Needed or not, these find a ready market. I have a few items that I believe add great value to my pen turning. I recommend that they all belong in the pen

turner's kit. A product that I find extremely valuable to sand dense hardwoods that will have no finish, those with a cyanoacrylate adhesive or lacquer finish, or a plastic, is Micro-Mesh. This abrasive – and yes it is an abrasive as mild as it may be – is crucial in achieving a mirror-like finish. Use it at low speed to allow it to cut, then run it through all of the grits to work the magic. Don't forget to wipe the blank clean between grits. You can use the padded or unpadded version of Micro-Mesh, but you need to

**BELOW:** The few tools that are needed to make a dramatic difference are modestly priced and readily available. Adding them to your kit will enable your capabilities and final results



have it in your kit to do the best finishing you can. Used and cleaned properly, it will last a lifetime, so it is a worthwhile investment. It uses a different scale than the standard FEPA or CAMI scale you are probably familiar with. The Micro-Mesh product that is of value to the pen turner starts at 1500 and progresses to 12,000 in nine steps. Another item I highly recommend is a mandrel saver. If you use the longer

two-piece mandrel, flexing or bending is a real potential. The mandrel saver will allow you to eliminate the threaded brass compression knob and use the tailstock pressure to squeeze the bushings and pen parts for turning. Because the mandrel saver 'swallows' the end of the mandrel shaft, the force it applies is directed on the bushings and the glued-up blanks, not the end of the mandrel. It allows for much more clamping force without the corresponding potential for mandrel bending. This can be purchased or simply made if you are handy in the workshop. I recommend it highly.

If you don't own a centre punch and a small hammer, I would suggest you get one. In a pinch, you can make do with a nail and stick of wood. Putting a physical centre mark on your blanks to start the drilling will let you control the exact point at which the drill will start. A nice tool to make centre marks is the spring-loaded centre punch. Regardless of your equipment, the physical centre mark will help your drilling process be more precise, allowing you to use thinner stock if you wish.

Some people do quite nicely with a disc sander to face off their glued up blanks. I use a pen mill in a drill press. The combination of piloting on the inner diameter of the brass tube and precise control over the cutting force gives me a perpendicular facing with minimal stock

**CONCLUSION**

Pen turning is among the simplest of the woodturning projects. The turning skills and tools needed are basic. It is easy to pick up, but that being said, you can spend many years trying to master it. Rather, it is the attention to detail that separates the ordinary pens from the superbly executed pens. No amount of expensive tools,

equipment, or techniques will give you a shortcut to a quality result unless you pay attention to the details. The suggestions made do not involve expensive purchases or add burdensome time to your process. The modest expenditures in tools recommended – callipers, centre punch, chamfer tool, pen

mill, and Micro-Mesh – will be more than made up in your final results. Any time added to your current process should also be more than beneficial to your resulting pens. The 20 steps detailed in the previous pages can help you move your pens from the run-of-the-mill, to that special category of 'standing above the crowd' ●