Ornamental Turners International

Vol. 26, No. 2
December, 2019

Geoffrey Saver's
Straight Line Box

President's Message

With 2019 coming rapidly to a close, your OTI board members have been working diligently to address both the challenges presented over this past year and OTI's plans for the new year. 2019 has marked some key organizational changes for us.

First, there has been a change in the position of OTI newsletter editor. For the past several years, John Lea has manned the editor's desk. Under his adept guidance, the newsletter has been the key communication tool for our organization and we are most grateful for his efforts over these many years. If you are like me, you look forward to the publication of the newsletter, and John's newsletters were always a pleasure to find in our e-mailboxes. Frank Dorion, our new editor, has accepted the challenge to keep the newsletter a vital and informative publication, but he will need your help.

The level of innovation and creativity in ornamental turning has never been more vibrant, and Frank feels the newsletter is a wonderful opportunity for us to share among ourselves the designs and techniques that can make ornamental turning more rewarding for all of us. Many of us have a technique, tool, or time saving "trick" that could be the basis of an article, but don't feel entirely comfortable tackling the writing end of it. No need for concern there. Some general information, written or verbal, on your topic plus a few photos taken with your cell phone are all that's required. Once you provide that information to Frank, he can work up an article for the newsletter. After your review, the article will be published under your name in the newsletter for the enjoyment and education of your fellow ornamental turners. So, if you have an idea for an article, please get in touch with Frank and he will help you get the ball rolling.

We also have a new hand, Richard Vanstrum, in the role of the role of secretary-treasurer. Charles Waggoner held that position previously and did a stellar job. Charles undertook a major effort to revamp the OTI books and has left them in good shape for Richard. A note on the treasurer's role here. Collecting dues for OTI memberships has historically been an administrative challenge. You can provide much needed assistance with this task by simply remembering to pay your OTI dues when you first receive the notice that they are due. Your making prompt payment saves much tedious follow up work by our treasurer.

I would like to take the opportunity here to recognize the contributions to OTI that John Lea and Charles Waggoner have made in their former respective roles as newsletter editor and secretary-treasurer. These guys spent countless hours over many years working on behalf of OTI. Their contributions were a big part of the glue that held this organization together and we owe them a tremendous vote of thanks for their selfless efforts on OTI's behalf. Thank you both, John and Charles, for your unswerving dedication to OTI and for the great service you've provided to our organization.

Looking forward to next year, I had previously announced that our 2020 OTI Symposium had contracted with Pheasant Run Resort near Chicago as the site for our meeting. In mid-November I found out that the resort was canceling our contract because of their recently revealed financial and operating issues. This news created a great deal of consternation as you can imagine. Fortunately, I have been able to find an alternate site that will allow us to host the symposium, but a week later than originally planned. The new date is September 24-27, 2020. A bonus is that the new site is closer to O'Hare airport. Once the new contract is in place, we will begin the registration process. We are counting on a large turnout for this event. We have a program packed with talented presenters who will surely expand your knowledge of ornamental turning. Among those presenters will be Fred Armbruster, Al Collins, Phil Poirier, John Moe, Wes Pilley, and David Lindow. Once completed, this elite group's list of topics will be posted to the website and Facebook. We are also planning a revamped "box challenge". More information on that soon.

As you can see there has been a good deal of ongoing activity on behalf of OTI's membership. The hope among those of us engaged in planning for and guiding OTI is that we can count on your continuing participation and support. Your registering for the 2020 OTI Symposium will certainly be rewarded with a most enjoyable experience. We hope to see you there!

Scott Barrett – President

Treasurer's Report

OTI Total Assets 6/1/19 $15, 357.58

PayPal Account

Starting Balance 6/1/19	$3,612.51
Memberships new and renewal	700.00
PayPal Fees	(26.40)
Ending Balance 12/1/19	$4,286.11

OTI Checking Account

Starting Balance 6/1/19	$11,745.07
Software support expenses	(381.30)
Ending Balance 12/1/19	$11,363.77

OTI Total Assets 12/1/19 $15,649.88
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OTI Officers 2019

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OTI Facebook Page Administrator – Wesley Pilley

The cover page shows the work of Geoffrey Saver and its creation is detailed in a feature article in this issue.

INSIDE THIS ISSUE

A Sad Note

We regret to report the passing of Dave Plemons whose beautiful faceted turnings were featured in our last issue. Dave was a talented turner and a genuinely nice guy. His quiet presence will be missed by many in the turning community.

African Blackwood Box
(See cover photo)
by Geoffrey Saver

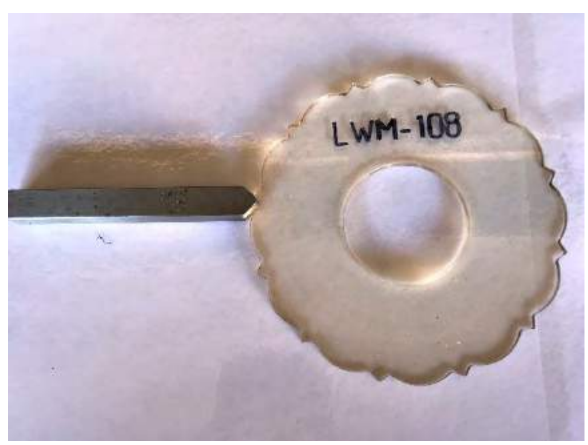
This box started out as an experiment using the straight line attachment on my Lindow White rose engine. The box and lid were cut from an African blackwood oboe bell, and the finial came from a separate piece of the same wood. The box measures 2-1/2" in diameter by 3-7/8" high. The lid is 2" in diameter by 3/4" thick. The finial is 1/2" in diameter at its base by 3-7/8" tall.

To get started, I first turned the blank for the box, rough shaping it between centers on a regular wood lathe and turning a tenon on the small end for chucking. Also, leave a flange of material (not shown on the photo of the sample blank) on the small end of the taper to form the base later. Mount the blank using the tenon, then drill the large end to accept an expanding chuck.

The next step is to set up the rose engine. First, mount the straight line attachment to the headstock, then mount the oblique dome chuck to the straight line attachment. My dome chuck was equipped with an index head to allow the turning to be indexed. The whole setup looked like this:

As you can see, I've remounted the finished piece to show the setup. When you are working with the blank, the large end would be mounted on the index head using the expanding chuck mentioned previously. Note that the dome chuck is tilted so that the tapered surface on the blank is perpendicular to the machine table. Now the blank is ready to be decorated.

The box, lid top and lid bottom were done using an LWM-108 rosette, using a 45º touch with a small radius on its tip.



All cuts were made with a universal cutting frame. Adjusting the depth of cut is a "cut and try" proposition. Start with a shallow cut, say .020" deep, cut vertically over the whole length of the taper. Then, index the blank 20º and make a second vertical pass. Continue to increase cutting depth over the first two passes in small increments, indexing back and forth, until the two lines of cuts meet from top to bottom on the blank. This establishes your depth of cut for the pattern. Proceed to index around the blank, cutting a vertical row every 20º until the pattern is complete around the circumference of the blank. I did these cuts in several .010" passes, with the last pass being very shallow, about .002" to get a nice finish on the cut.

Then it was back to the regular wood lathe, rechucking the box by its tenon to hollow out the inside and finish turn the rim. With that done, the tenon was cut off and the box was reversed and held in a Cole chuck. (If you don't have a Cole chuck, a jam chuck would work too.) Now the bottom was accessible for finish turning. This is the point where you would also decorate the bottom of the box if desired. The box is now completed.

Next comes the lid, done with the same rosette and touch as the box. Start with a piece of African blackwood 2" in diameter by 3/4" thick. Mount it in a chuck and turn a shallow rabbet to fit the inside of the box. Then, cut a decorative pattern on its surface, something like the example shown here:

Now, reverse the lid in the chuck to turn the upper side of the lid. Drill a blind hole in the center to mount the finial and note where the finished diameter of the finial's base will fall so you won't cut into that area when decorating the top of the lid. Then proceed to cut the pattern shown below.

The last piece to complete the box is the finial. Here I must admit to using an unusual setup. Inspired by an idea developed by Peter Gerstel (Thanks, Peter!), I built a dedicated finial lathe for operations like this. My finial lathe simplifies turning a finial as it provides power feed to a curvilinear slide which carries the cutting frame and an easy way to do the angular adjustment of the slide. [Editor's Note: See more on Geoffrey's finial lathe elsewhere in this newsletter.) The finial can, of course, be turned on a regular slide, just not so conveniently. Set the slide for a 1º taper, mount a suitable piece of African blackwood in the chuck and use the setup shown to cut the finial.

With the finial mounted on the lid, your box components should now look like this:

This box was fun to make and I hope you will enjoy making yours.

Creating a Simple Concave Fluted Spherical Box Using the Dome Chuck

by

Roy Lindley

Introduction

Habitually I seek unique ideas which leverage the capabilities of the Rose Engine lathe. Because of a local club gallery challenge I begin to explore how to cut uniform concave flutes yet retain the spherical profile as established by the peaks between cuts. This proved to be relatively easy but requires a rosette specific to the measurements chosen. The following narrative explains how I determined the rosette profile and executed the actual project beginning with two rough turned hemispherical halves with the interior finished.

Plain Fluted Hemisphere

The simple dome is generated with the centerline of the horizontal cutting frame's cutter point coinciding with the lathe centerline and the center of the hemisphere work piece plane on a dome chuck. This workpiece centerline is 90 degrees from the lathe axis and the cutter path is a straight line from the edge (waist) of the hemisphere to the top. Cutting straight flutes (arcs because of the dome chuck rotation) on the surface of a hemisphere (such that the edges between cuts leave a spherical profile) requires the cut depth to vary with lathe spindle angle. The cuts become shallow and converge at the top of the hemisphere and are the greatest depth around the waist of that hemisphere. To create this pattern on the Rose Engine dome chuck, the lathe headstock must rock by the cut depth as the lathe spindle is turned. That depth depends on the radius of the hemisphere, the radius of the cutter used, the number of arcs around the waist, and the lathe spindle angle.

Mathematical derivation of the above variables is somewhat complex, so I will first present some useful examples of these variables. Their mathematical derivation is described at the end of this article.

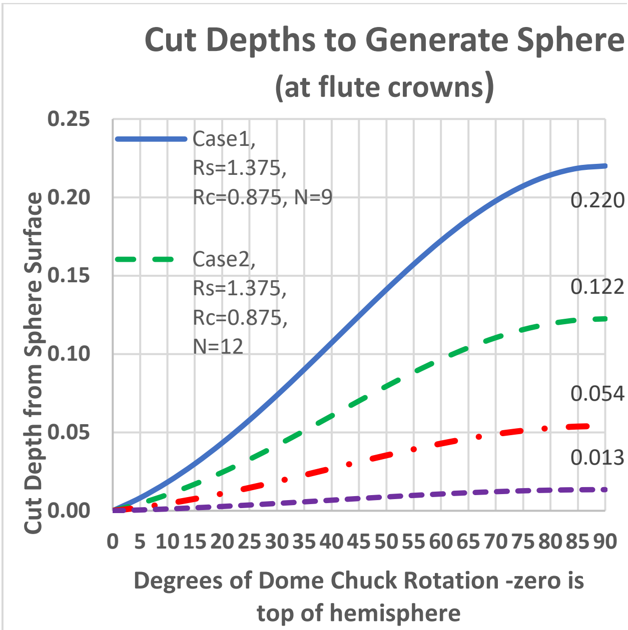
Here are the variables defined:

Var.	Description	Notes
D=	Cutting depth (in)	Amount Rosette must move work-piece toward cutter from sphere surface profile.
R_s =	Sphere (hemisphere) radius (in)	Radius is one half diameter.
R_c =	Cutter radius (in)	For cutter plane parallel to table and at waist of hemisphere.
Ø =	Angle of spindle (degrees)	Ø is zero with hemispherical plane vertical to the lathe table in the dome chuck. Value is 90 degrees when hemispherical plane parallels lathe table.
Θ =	Width of arc around hemisphere perimeter (degrees)	Θ = 180/N in degrees.
N =	Number of arcs around perimeter of hemisphere (integer)	With the limitations of simple indexing mechanisms, this usually needs to result in a multiple of 5 degrees. Practical values are 9, 12, 18, 24, 36, or 72.

Cutting depth is zero at the top of the hemisphere and is the maximum at the waist. Further, a greater number of flutes reduces cutting depth (compared to fewer flutes) as does increasing the cutter radius. Also, cutting depth increases with increasing sphere radius (assuming cutter radius is constant). The following figures and tables provide more perspective on this based on some parameter ranges I use.

For example, one can create a 2.75 in. diameter sphere (R_s - two halves) from 3 x 3 x 3 in. stock. Further I have found there is adequate working clearance if the horizontal cutting platform cutter radius point (R_c) is around 0.875 in. for N values between 12 and 36. For these values some calculated cutting depths are given in Table 1 at 5 degree spindle angle increments.

From inspection of the table, one can verify the impact N values have on cutting depth. However, one cannot readily visualize whether the cutting depth is sinusoidal, linear, or something else relative to spindle angle. From Figure 1 for this table, a large N is most nearly linear and the smaller N is more sinusoidal but not exactly.



<u>Figure 1</u> Plot of Cutting Depth as a Function of Lathe Spindle Rotation in Degrees

<u>Creating a Rosette</u>

A custom rosette is required to do this project. One way to make a suitable rosette is to mount an acrylic blank on a lathe spindle with indexing capability and use a pointed engraving cutter mounted on an accurate cross-side to cut the proper depth at each angle increment from Table 1. When completed on the lathe for the full 90-degree sweep, remove the waste between reference cuts and carefully work down to the bottom of the depth cut by hand such as with a 180 grit abrasive sanding block. While not terribly precise, sight errors are not apparent if the rosette profile feels smooth to the hand and the end points are

TABLE 1 CUT DEPTH (ROSETTE PROFILE) AS FUNCTION OF LATHE SPINDLE ROTATION FOR PLAIN CONCAVE FLUTES

	Case1, Rs=1.375, Rc=0.875,	Case2, Rs=1.375, Rc=0.875,	Case3, Rs=1.375, Rc=0.875,	Case4, Rs=1.375, Rc=0.875,
	20	15	10	5
Rc	0.875	0.875	0.875	0.875
N	9	12	18	36
Phi (deg.)	Depth	Depth	Depth	Depth
0	0.000	0.000	0.000	0.000
5	0.008	0.005	0.002	0.001
10	0.018	0.010	0.005	0.001
15	0.030	0.017	0.008	0.002
20	0.043	0.025	0.011	0.003
25	0.058	0.033	0.015	0.004
30	0.074	0.042	0.019	0.005
35	0.090	0.051	0.023	0.006
40	0.107	0.061	0.027	0.007
45	0.124	0.070	0.031	0.008
50	0.141	0.079	0.035	0.009
55	0.157	0.088	0.039	0.010
60	0.172	0.097	0.043	0.011
65	0.186	0.104	0.046	0.012
70	0.198	0.110	0.049	0.012
75	0.207	0.116	0.051	0.013
80	0.214	0.119	0.053	0.013
85	0.219	0.122	0.054	0.013
90	0.220	0.122	0.054	0.013

accurate when done. As part of this process, I mark the side of the rosette to keep track of the end points. These marks are necessary when the rosette angular position is being synchronized with the work piece mounted on the dome chuck. Also, many times, I will put two or three cut profiles on one acrylic blank. I recommend attaching labels giving the variable values and date since the profiles are specific to one case unless one is willing to accept something only close to a spherical profile.

Parameters for the plain flute example article here are for Case 2 in Table 1. Parameters are:

- R_s = 1.375 in. (Sphere diameter = 2.75 in.)
- R_c = .875 in. (pointed cutter radius)
- N = 12

Roughing out the Hemispheres

Upon completing a suitable rosette, I prepare two hemispherical blanks for the project. To hold the work-piece I create a bore such as shown in Figure 2. In this example, the inside diameter is 1.75 in. and the bore is .625 in. from the face. This leaves a .250 in. wall at the top and slightly less at the corners because of the external cuts represented by the dotted lines. In addition, I create a flange on one piece and a counter bore on the other half (not shown) with a light friction fit. From my perspective the important thing is to match the two bore depths which allows the second work-piece to be mounted with minimal setup change after the exterior pattern has been added to the first piece. To make the piece more interesting I often add a barleycorn-like pattern to the inside of the domes rather than leave a plain surface from the hollowing. A metal lathe is useful to create the bore and flange fit. An ordinary wood lathe enables the finish hollowing, and then inside dome patterns can be done on a rose engine.

Once the halves are complete, I mount one of them on an expanding collet which interfaces with the indexing setup of the dome chuck.

Work-piece Holding and Lathe Setup:

Figure 3 shows the hemispherical blank mounted on the dome chuck. The centerline of the sphere is positioned exactly on the lathe spindle axis. This position can be established several ways. I measure from

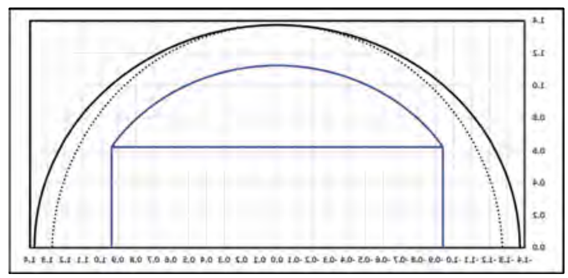


FIGURE 1 CROSS SECTION OF FINISHED HEMISPHERICAL BOX HALF

the table to the center height for one axis. For the second axis I match the heights of the blank's diameter at positions 180 degrees (spindle rotation) apart. The centerline position should be reasonably accurate although when measuring as the cuts are made with rosette controlled rocking some fine tuning is likely necessary.

As with other Rose engine work the cutter plane centerline for the point should be positioned at spindle height from the table. I

Figure 2 Hemispherical Blank Correctly Positioned in Dome Chuck after First Twelve Cuts

have a stick cut to length for this purpose. While not precise, a slight difference can be corrected during the cutting and measuring process. As with the centerline position and rosette errors, this can be corrected by adjusting the work piece position slightly in the direction parallel to the hemisphere centerline (nearly vertical slide in the figure).

Another setup adjustment is to match the rosette 0 and 90 degree positions with the dome chuck position. The rosette needs to be mounted for zero rocking motion when the cutter head is at the top of the work piece and full motion happens at the hemisphere waist. I use a level on the dome chuck and align the angle end mark with the rubber centerline. Theoretically the rubber should be a sharp edge but as a practical matter a small roller or solid radius is fine because the Rosette changes are not dramatic.

Cutting Flutes and Measuring:

Usually, I incrementally approach the final cuts creating the flutes. I cut partway to the final dimensions at each of the index positions. As the cut begins to be continuous through the full 90-degree rotation and flutes have been cut for all planned faces (12 in this example), I start measuring and recording the dome height and minimum diameter of the cutter path (flute centerline) at the waist. The latter is relatively straight forward with an ordinary dial caliper with an even number of increments. The finished distance across the centerlines of the flutes of the example is 2.506 in. [2*(1.375-.122)]. Dome height is a bit more difficult to measure directly. I fabricated the acrylic fixture shown in Figure 4 for this purpose. When the feet are held on the hemisphere dividing plane, one can easily measure to the work-piece top. Subtraction yields the dome height and compare to the waist dimensions.

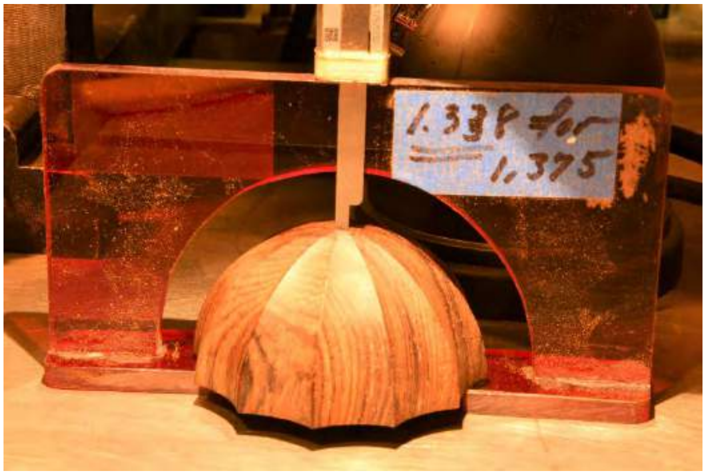


FIGURE 3 DOME HEIGHT MEASURING DEVICE

From these numbers I determine an amount to move the work-piece (relative to final values), if at all, for the next cut as well as a new cross-slide/cutter position. The impact of the fine-tuning adjustment should be apparent with the next cut and measure cycle and provides a basis for the next adjustment movement, if required. The correct position is when the amount of diametral material (as measured between opposing flute centerlines) to be removed is twice the material to be removed from the top of the hemisphere based on several cut and measure cycles. Once fine tuning is done and verified, one can cut flutes to their final dimensions (for the example, diameter at the bottom of the flutes should be 2.506 in. and the height should be 1.375 in.). Assuming the second half has an identical bore depth to the first, the second piece can be done with only replicating the cutter position although in my experience some fine tuning is still necessary.

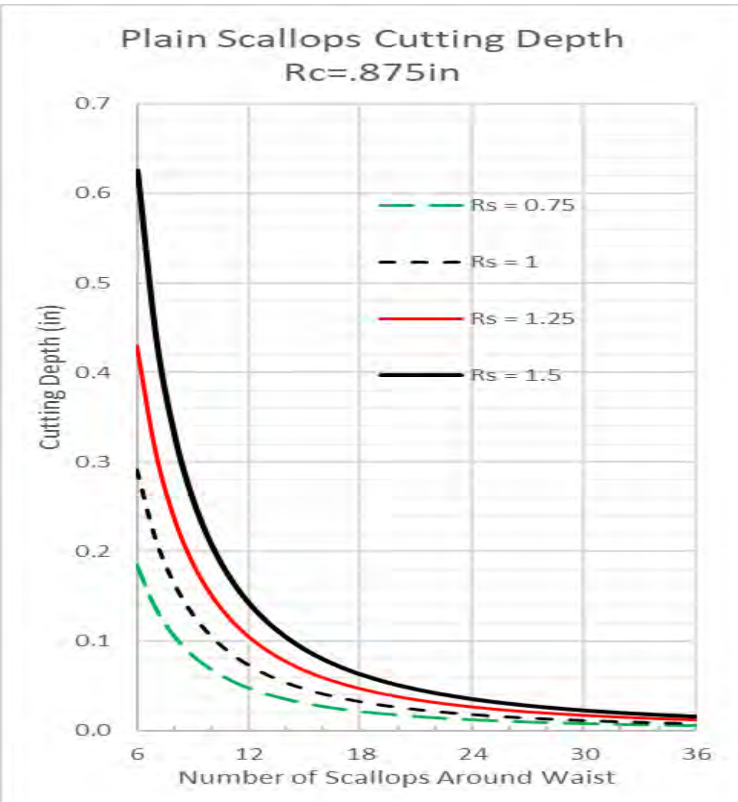
Finished Piece:

For the grain patterns of the two halves to match a good practice is to mark the halves at a common position before mounting on the dome chuck. The marks can be aligned to the indexing box centerline at the zero-degree position. If this is done carefully, there should be a close match if as little material as possible has been removed between the two halves. In my example, this was about 0.25 in. for the saw kerf and the 0.125 in. high flange that mates with a bore. Another good practice to make the match plane fit closer is to taper one or both faces slightly to create full contact at the edges of the fluted waist.

Practical Shop Approach: The foregoing provides a means to make a relatively precise simple fluted box as two hemispheres. If some dimensional variations are acceptable, then the rosette need not correspond to the precise values provided. The general shape of rosette motion could be satisfactory for pleasing results. Additional values for a variety of sphere radii and 0.875 in. cutter radius are given in Figure 5 (.75, 1.0, 1.25, and 1.5 in. sphere diameters). A larger cutter radius will cut shallower and a smaller cutter radius will cut deeper than the amounts shown. The values shown are also valid if one is making a concave fluted cylinder with the same number of flutes, work piece radius, and cutter radius.

Variation for Spiral Like Cut Appearance

Figure 5 Plain Concave Flute Cutting Depth (Rosette rock) for Different Flute Counts and 0.875 Cutter Radius



If the workpiece centerline is angled in the dome chuck, a spiral like shape results even though the cutting path is a straight line. This requires a different rosette profile. I plan to prepare another article which will explain how to do this and how the rosette compares to the one needed for the example in this article. Figure 6 is an example of this spiral like variation.

Figure 6 Example of Spiral Look From Setup Variation

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For the mathematically inclined, from geometry and trigonometry fundamentals, the equation below relates angle of spindle rotation and rocking distance. This equation was used to calculate the values for cutting depth in the preceding tables.

$$D = [R_S \sin \varnothing\, (1-\cos \theta)] + R_C - \sqrt{[R_C^2 - (R_S \sin \varnothing \sin \theta)^2]}$$

Excel™ software is a useful tool to understand and quantify mathematical expressions. A particularly useful aspect in lieu of actual trial and error on the lathe is to explore ranges of values including those possible within the constraints of your rose engine lathe or that match available materials.

Elliptical Box in African Blackwood
by
Chris Joyce

Photo 1

This box was done on my MDF lathe and my conventional wood lathe (for the plain turning). My MDF lathe was built from one of Jon Magill's kits. I use rosettes obtained from Jon and cutting frames from David Lindow. The setup is shown in Photo 2.

I always start my boxes by turning between centers, making a tenon on each end and parting the lid section off, giving me a way to hold each part in the chuck. The diameter of the blank should be slightly greater than the length of the major axis you plan to have on the elliptical box.

Now move the blank to the rose engine. I used my homemade eccentric chuck, Photo 3, for indexing purposes and mounted a scroll chuck on it to grab the tenon on the bottom of the blank. The eccentric chuck is an adaptation of a Bill Ooms design which you can see here: https://www.youtube.com/watch?v=Meld0eGem0U I don't have an elliptical chuck, so the box's elliptical shape was cut with the elliptical rosette shown in Photo 4. Using a universal cutting frame, I roughed out the box's elliptical shape.

Photo 2

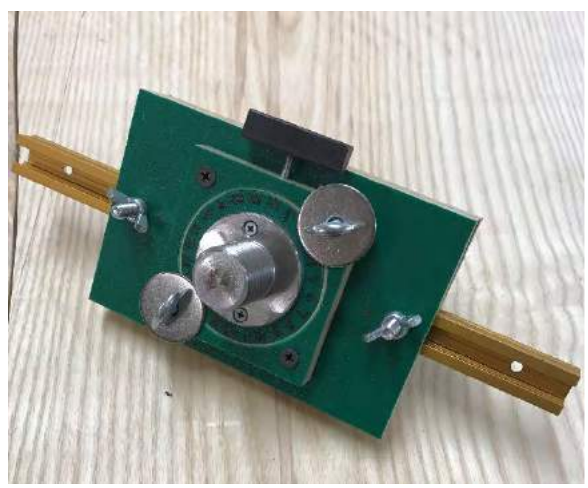


Photo 3

It may not be easily discernable in Photo 1, but the box has a slight taper, approximately 3^{o}, from top to bottom. Set your compound slide to that angle before making the roughing cut.

Photo 4

With the box's elliptical shape now defined, the next step is to hollow out the inside of the box. I used a 1/4" diameter extra-long end mill in a drilling frame, Photo 5, to hollow out the interior of the box. Cutting depth was about .050" per pass. Another approach would be to take the blank out of the chuck, drill or turn out out as much of the waste material as possible, then finish up with the end mill. Be sure to mark the blank carefully so you can return it to the chuck precisely in its original position.

Once the bulk of the interior material has been removed, a final very light cut on the inside walls will minimize any required sanding. The cross slide will need to be readjusted parallel to the spindle axis to cut a flat surface on the bottom. If desired, a pattern could be cut on the interior bottom before the next step. At this stage I also cut the rabbet for the lid around the interior of the top edge.

Now it's back to the box's exterior to cut the flutes. Be sure to maintain the same taper angle used on the box's interior. Rotate the UCF so the cutter is spinning in a vertical plane. Then begin the fluting by making a series of two adjacent passes 15^{o} apart down the side of the box with the cross slide, increasing the depth of cut each time until the two flutes just meet. With the final depth of cut established, back the cutter out and begin to cut the remainder of the flutes, indexing around the box at 15^{o} intervals. A final very light cut around the box will improve the finished surface.

Photo 5

The fluting completed, I used a 1/8" end mill in the drilling frame as a parting tool to remove the box from the waste in the chuck. You'll notice in Photo 6 that this technique left an interesting chatter texture on the bottom of the boxes as well as the classic figure 8 characteristic of elliptical work. I liked the effect so I left it.

To cut the box lid, I used an approach similar to what I did to make the box. Chuck the lid blank on the wood lathe and turn it round to a diameter slightly larger than the major axis of the lid's ellipse. Then, turn a short tenon as shown in Photo 7.

Photo 6

This tenon will serve to hold the lid while its top is being cut to shape and decorated. Once the tenon was cut, I transferred the lid to the rose engine, cut the lid's elliptical shape, using tiny cuts and taking great care to get a nice push fit into the top of the box. I also cut a decorative design on the face of the tenon.

Then it was back to the wood lathe. Gripping the tenon on the underside of the lid, I shaped the top of the lid. Moving to the rose engine once more, I ornamented the top of the lid using a 12-lobe sine wave rosette. At that point, I hadn't shaped the knob on the top of the lid, so I did that on the wood lathe, blending the knob into the area I had just ornamented. The final step was cutting a fluted design on the tip of the knob as shown, using the same 12-lobe rosette.

Photo 7

Here's a last look at the completed box.

Photo 8

Ornamental Turning Book of Knowledge (OTBoK) -

A New Web Site

By

Rich Colvin

I first encountered ornamental turning at the Atlanta AAW symposium in 2017. Jon Magill gave me a view into a world of wonders, and I was hooked.

But I found that actually getting started with OT was difficult. Whilst other hobbies have either a good process for helping people get started, OT does not. Some have experts like the "elmers" in amateur radio. Other have classes, which are easy to find and take. And others have a good online presence to help others get started (e.g., AAW and Tormek forums).

And, in April of 2018, I was ready to give up on this one. But Brad Davis and Jon Magill encouraged me on. And John Lea said," ... the OTI members who share knowledge and thoughtful responses to enquiries are volunteers, (and) we have to appreciate that we might not learn from them if we don't join the membership and get involved." So, I persevered.

I was told that Holtzapffel's Volume V was the authoritative source and operator's manual, but I discovered the stilted language was difficult getting used to. It reminded me of the old English in the King James Bible. Because so many were urging me on, I persevered. And made mistakes. And had some successes. But I really felt it was necessary for me to make this journey easier for others. So, I established a web site I call the Ornamental Turning Book of Knowledge (www.OTBoK.info).

The goals of the site are to 1) present information that enables the new ornamental turner to get started in a way that was easier than I experienced, and 2) direct them to companies where they can find parts.

The topics documented use simple diagrams, and videos where I can find them. And I've found the OT community very willing to allow use their pictures where it made sense. And all get attributions for their contributions.

It seems to be effective. The statistics for the web site show a growth in its use that indicates others are finding it useful.

I want this to be a free, web-based reference tool for those who are new to ornamental turning. I don't like sites with pop-ups, or which track the user for whatever nefarious reasons, so you won't find that here.

If you have ideas or thoughts, please send them to me. Notes that could help make this better would be greatly appreciated (and will probably be added).

I can be contacted at OTBookOfKnowledge@Gmail.com

Rich Colvin

Using a Leveling Chuck

by
Frank Dorion

In our last newsletter we promised to delve more deeply into the use of a leveling chuck, so here we go! We are fortunate in this exercise to include extensive material and illustrations prepared by David Lindow which he is generously sharing with us.

Let's begin by revisiting a diagram we used last time to illustrate why a leveling chuck is often required in ornamental turning. In Figure 1, you first see the ideal condition in the top example. There the work piece is perfectly aligned with the lathe spindle so that both rotate on the same axis over their whole length. Achieving this alignment means that your decorative cuts will be precisely centered on your work piece and your depth of cut will be uniform over the work piece's entire surface.

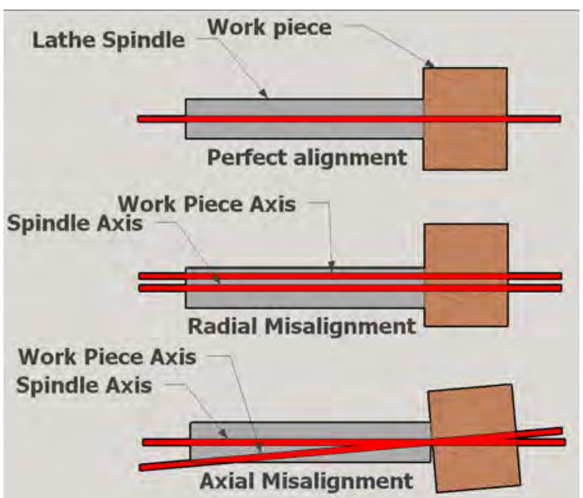


Figure 1

The middle example in Figure 1 illustrates the case of radial misalignment. The two axes of rotation are parallel, but not colinear, so the work piece will have an eccentric motion. As a result, your cuts will be off center on the end of a blank, creating a very visible error. If you are cutting around the side of a cylinder, your depth of cut will be inconsistent, deep on one side and shallow on the other.

In the bottom example of Figure 1, we illustrate the condition of axial misalignment where the work piece's axis of rotation is neither parallel nor colinear with the lathe spindle's axis. The result of this condition is usually a fine old mess with your depth of cut on the end of a cylinder varying from too deep to too shallow. Proper axial alignment is particularly important in guilloche work because the depth of cut is so shallow that any irregularity is very conspicuous.

Addressing the above alignment issues in a highly precise fashion is critical to achieving success in ornamental turning. As David has noted, "The leveling or truing chuck is the traditional way of compensating for uneven materials or inaccuracies in work holding systems when moving from machine to machine."

Let's first take a look at a leveling chuck to see how it works. These chucks come in a variety of designs, but they all share the same basic functions. If you understand these functions, you can use any of the variations in leveling chuck design.

Figure 2 is a photo of a leveling chuck I built using drawings generously provided by Bill Brinker. The back of the chuck is threaded to mount on the rose engine spindle nose. The round opening at the front of the chuck accepts a variety of scroll chucks, 3-jaw, 4-jaw, 6-jaw, etc., which mount to the leveling chuck via a simple 2" diameter tenon on their back plate. The design of the leveling chuck allows the work-holding chuck to be shifted side to side for radial alignment and

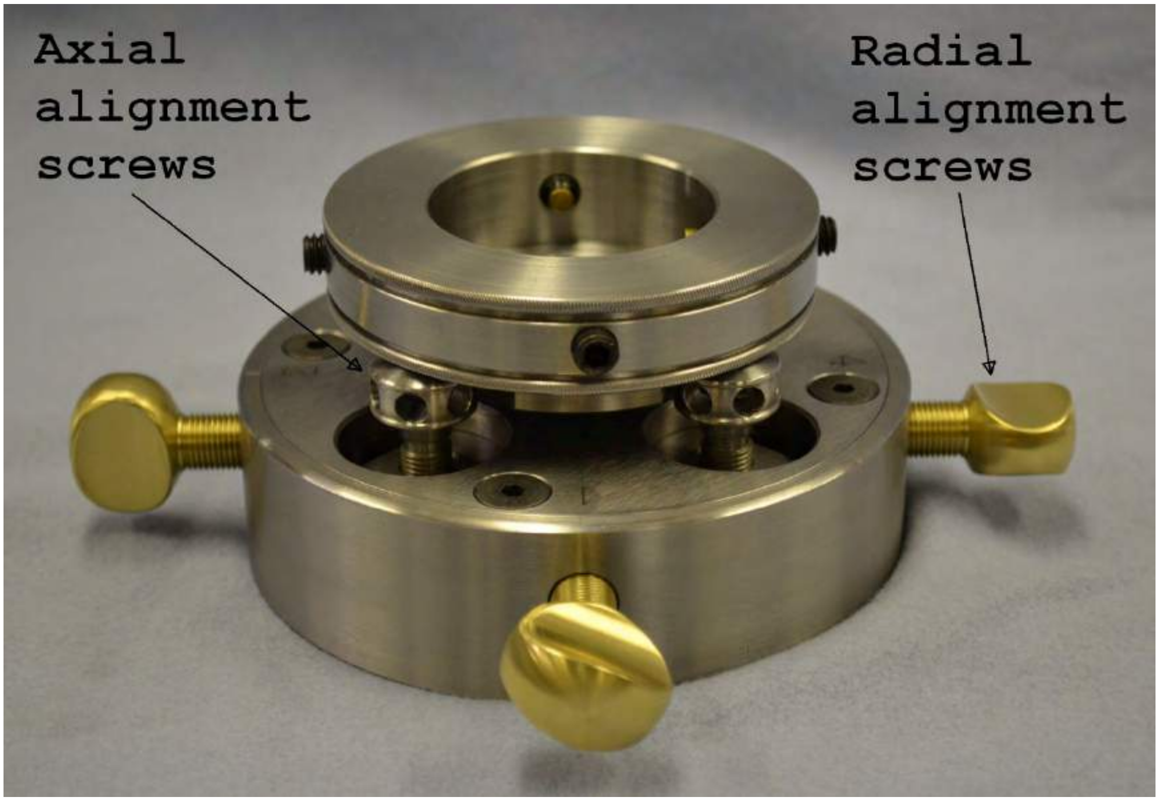


Figure 2

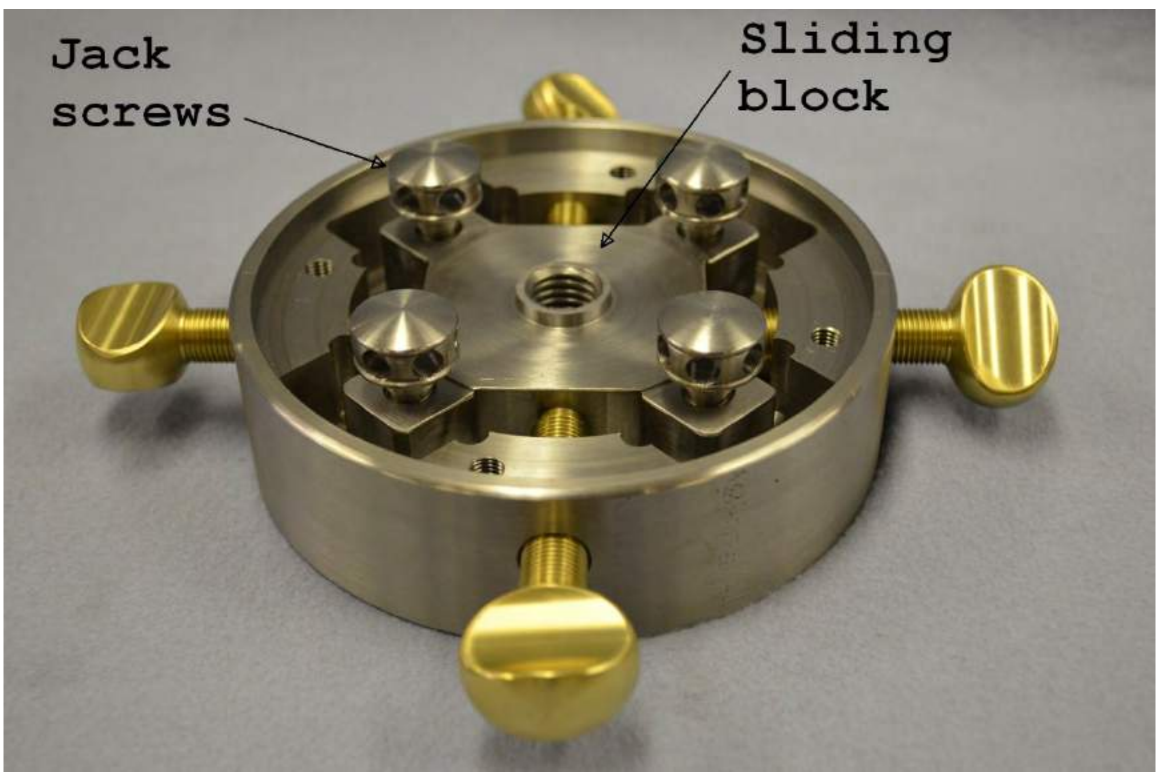


Figure 3

tilted for axial alignment. In Figures 2 and 3, the brass thumbscrews are used to accomplish radial alignment. In Figure 3 you can see the "guts" of the leveling chuck and it's clear how the two pairs of opposed thumbscrews can be used to shift the sliding block around. The jack screws are operated by a pin wrench to "tilt" the workholding chuck into axial alignment with the lathe spindle.

So how does all this alignment stuff work in practice? David has developed a step-by-step procedure that can guide us on this question. In the illustrations that follow, the leveling chuck shown is different from the one shown previously. However, both chucks operate in precisely the same fashion. In David's more compact chuck, four square-headed jacking screws for axial alignment are tucked in a slot on the side of the chuck and the four Allen-head set screws that do radial alignment are visible around the periphery of the chuck.

To begin the alignment process, you will need wrenches to suit your leveling chuck, a dial indicator with a magnetic base and a scroll chuck to mount your work piece. If you don't have a dial indicator, it's time to go shopping. Get one with a 0-1" travel range. Fortunately, most of the many imported dial indicators now available are quite affordable and perform reliably for the task at hand.

The best approach is to first align the leveling chuck itself. That makes the subsequent alignment of the work piece blank much easier. Basically, aligning the leveling chuck first gets you into ballpark range of accuracy. The second alignment, done on the work piece now held in a scroll chuck, addresses the inaccuracy in the scroll chuck and any irregularity in the work piece itself.

NOTE: You will need to have your rose engine's headstock locked at top dead center throughout this process.

Step 1 of the first alignment sequence is to true up the leveling chuck's face axially.

Figure 4

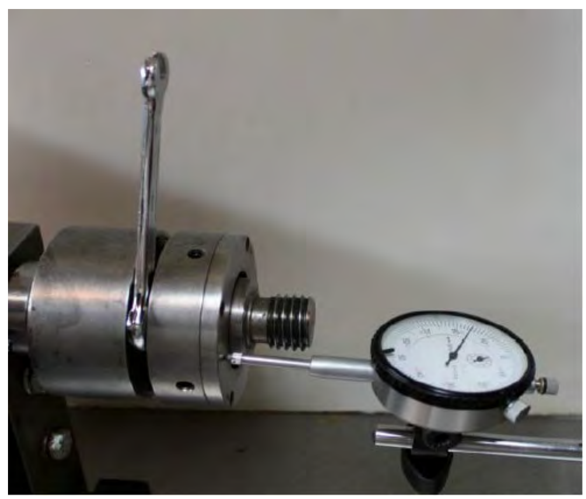


Figure 5

Place a dial indicator against the face of the chuck as shown in Figure 4. If the leveling chuck is in alignment axially there will be minimal movement of the indicator needle. If the leveling chuck needs to be aligned, identify which square-headed bolt need to be loosened and the opposite bolt that needs to be tightened. Make the adjustment with a wrench as shown in Figure 5. Repeat the process until there is minimal movement of the indicator.

Step 2 of the first alignment sequence begins by placing the dial indicator against the spindle of the leveling chuck as shown in Figure 6. Then, rotate the headstock spindle. If the leveling chuck is in alignment radially, there will be minimal movement of the indicator.

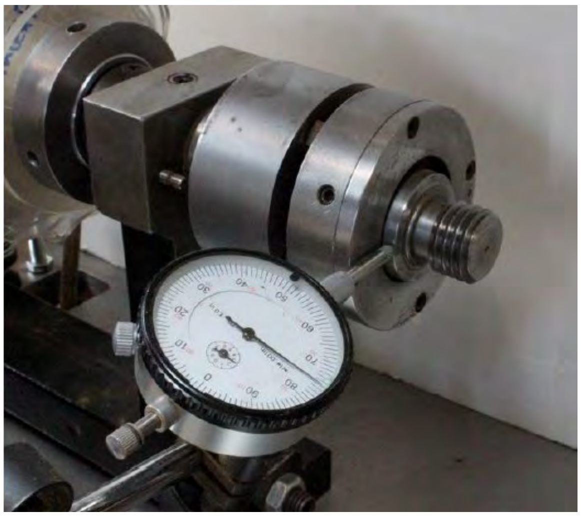


Figure 6

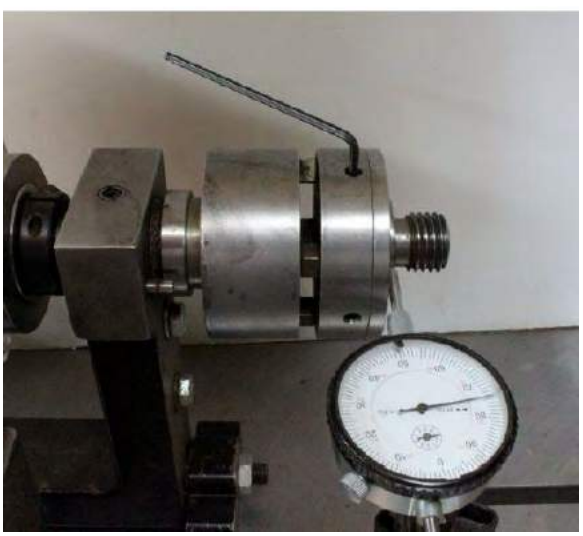


Figure 7

If the leveling chuck needs to be aligned, identify which Allen-head set screw needs to be loosened and the opposite screw that needs to be tightened. Make adjustments with an Allen wrench and repeat the process until there is minimal movement of the indicator.

The second alignment sequence is mostly a repetition of the first sequence. This time, however, the dial indicator will be tracking the actual work piece mounted in a scroll chuck which is mounted in turn on the aligned leveling chuck.

Figure 8

Figure 9

Figure 8 illustrates the setup for axial alignment. Make adjustments as in the first alignment sequence until indicator movement is minimal.

Figure 9 shows the indicator's position for radial alignment. Again, adjust as in the first sequence for minimal indicator movement.

So, those are the general mechanics of aligning a work piece for rose engine work. In addition to that information, it may be helpful to discuss a couple of other related topics. Remember, the goal here is to maximize the accuracy of your rose engine setup. The dial indicator you are using is graduated in increments of .001". Tiny inaccuracies will become visible in the movements of that indicator's needle. It is quite possible to drive yourself bonkers chasing those last few thousandths of an inch. But, as in many other situations, a methodical approach will preserve your sanity and make your alignment technique efficient and accurate.

Start by taking a felt-tip marker and numbering the four axial adjusting bolts 1 through 4. Now you have two pairs of opposed adjusters, 1 opposite 3, and 2 opposite 4. Pick one pair (it doesn't matter which pair), say, 1 and 3. Put the indicator tip against the chuck or work piece, whichever you are aligning. Note the indicator reading at adjuster 1, then the reading at adjuster 3. Let's say that 1 reads +.020" and 3 reads higher at +.050", a difference of .030". Loosen 3, the high point, a bit and then tighten 1 until it comes up about .015", half the difference. Now snug up 3 again and read both 1 and 3. They probably won't be exactly the same, but they will be much closer to each other. Adjust 1 and 3 again by half the difference between the second pair of readings to reduce the new difference even further.

It may take another couple of iterations to minimize the difference between 1 and 3, but once you've done this a few times, it goes very quickly. Don't aim for perfection here, just get 1 and 3 close. Let's say that after adjustments, 1 and 3 are each close to a reading of .035". Now to deal with 2 and 4. Leave the indicator in the same position it was for the readings on 1 and 3.

Take readings at 2 and 4. Let's say 2 is the lower reading. Loosen 4, bring 2 up to about .035", then snug up 4 again. Watch the indicator dial through a complete rotation of the spindle. All four points should be relatively close to one another now. Some final tweaking using the method just described will get you to the minimum needle movement attainable.

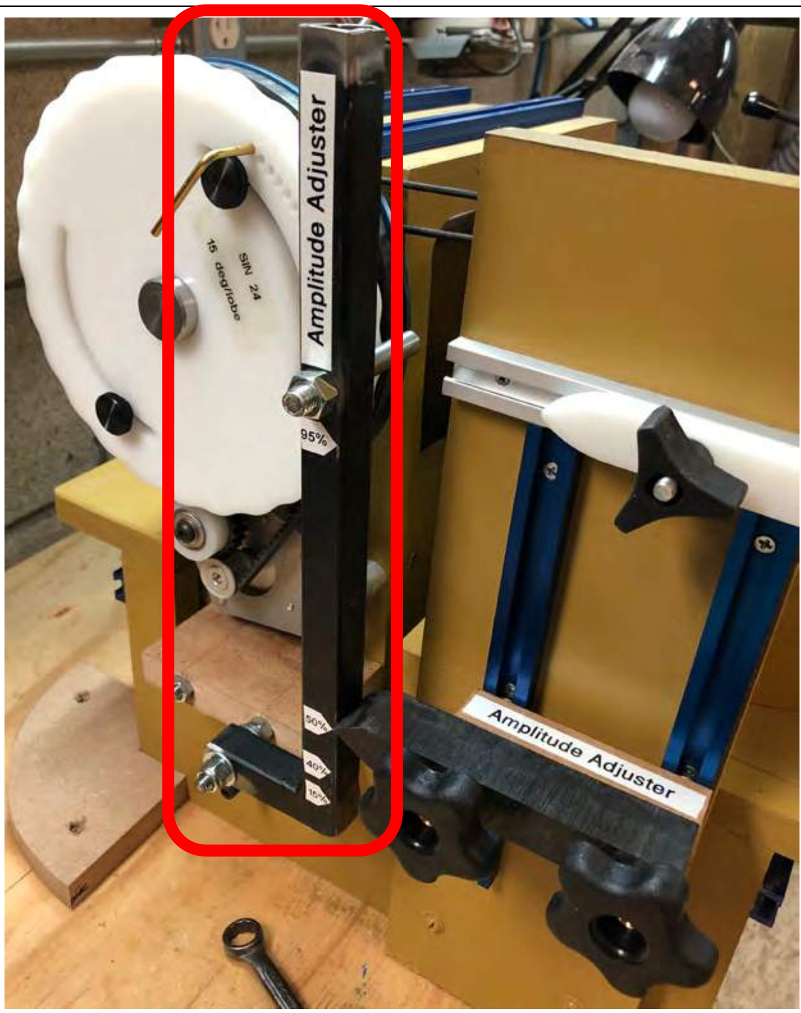
Regarding the tweaking, keep in mind that .001" is a very tiny dimension. Making final alignment adjustments in increments of .001" often comes down to just slightly increasing pressure on one screw without slacking the opposite screw at all. Watch the dial as you make adjustments and you will soon get a feel for what's needed.

Also, be prepared to discover that not all "round" things are actually round. Wood movement is one common source of trouble, but even metal parts can be out of round. Be assured though that, while perfection may not be attainable, the method described above will get your project running as true as it can.

If you have read this far, you may be entertaining the thought that the "convoluted" alignment process I've described will take forever. In fact, it typically takes less than five minutes to go through an alignment once you've done it a few times. Just don't make it your last project of the day!

Amplitude Adjuster for an MDF Rose Engine – by Rich Colvin

This article is about the amplitude adjuster I made for my MDF rose engine. The picture of the fully installed parts is shown in picture to the right. As shown, this unit can reduce amplitude down to less than 10% of what a rosette normally yields. It does not increase amplitude.

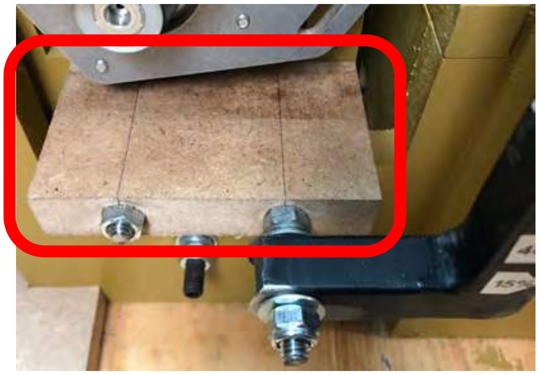


The black **lever arm** (with the vertical label "Amplitude Adjuster") is made from 0.75" square steel tubing. Nothing is magical about that: I just had it around.

The bottom part of the arm is 3" long, and the vertical part is 12" long.

The other parts needed to make this for my machine are outlined below

A **block** had to be made to move the steel lever arm 2.5" out from the headstock. This was to ensure the lever had room to clear the rosettes. This block (the unpainted MDF in the picture to the right) is 4" x 2.5" x 0.75".

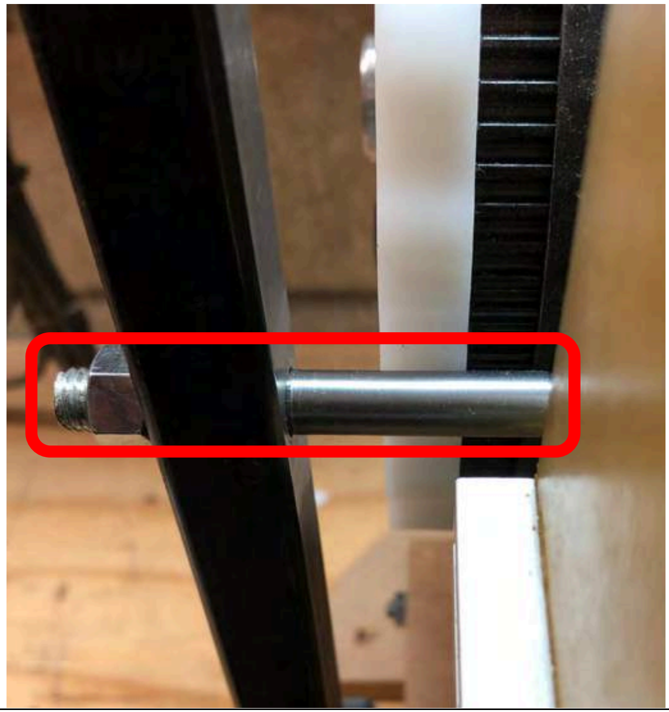


The bolts attaching this block to the headstock are 5/16" – 18 carriage bolts. The left one is 3.5" long; the right one 5".

The bolt on the right is held in place with a standard nut, and the steel lever arm is held in place by a lock nut. The use of a lock nut allows the lever arm to pivot back and forth without loosening the nut.

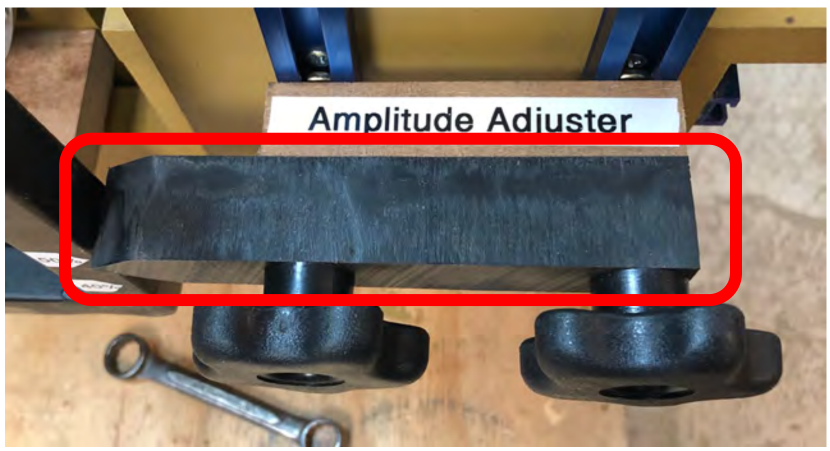
The **rosette touch** (the chrome part shown in the picture to the right) is a partially threaded, hex head, $^{3}/_{8}$-16 screw with the head cut off. Part number [91257A636]() from [McMaster-Carr]() is an example.

This hole for this is drilled in the arm so that it is vertically aligned with the spindle’s axis. In my case, that was 8.5” up from the bottom of the lever.



The **amplifying touch** shown here is made from [Delrin](), but it could also be made from aluminum. (If using aluminum, a roller end is a good option worth exploring.)

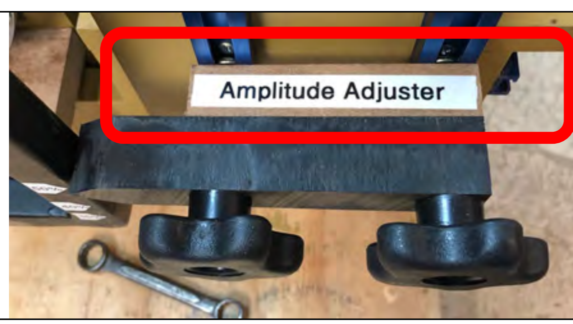
It slides up and down, and is affixed in place using T-track (the blue parts).



It also has slots cut in it to allow it to slide in and out (left and right in this picture). This is to allow it to align the headstock properly.

The one I made is 5.25” long, 1” wide, and 0.75” thick (same as the MDF spacer).

The MDF spacer (the unpainted MDF in the picture with the label, “Amplitude Adjuster”) is used to align the amplifying touch with the lever arm. It is 3.75” long and 0.75” square.



Ornamental Turning Showcase

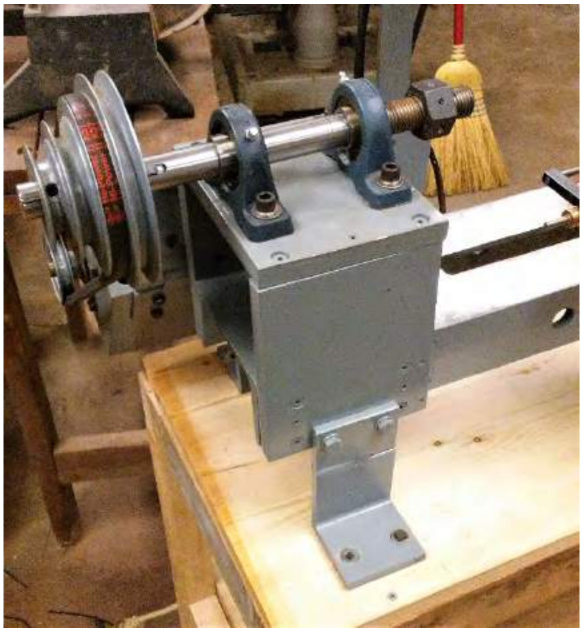
Here's a lovely box by Wes Pilley – African blackwood, pink ivory and maple.

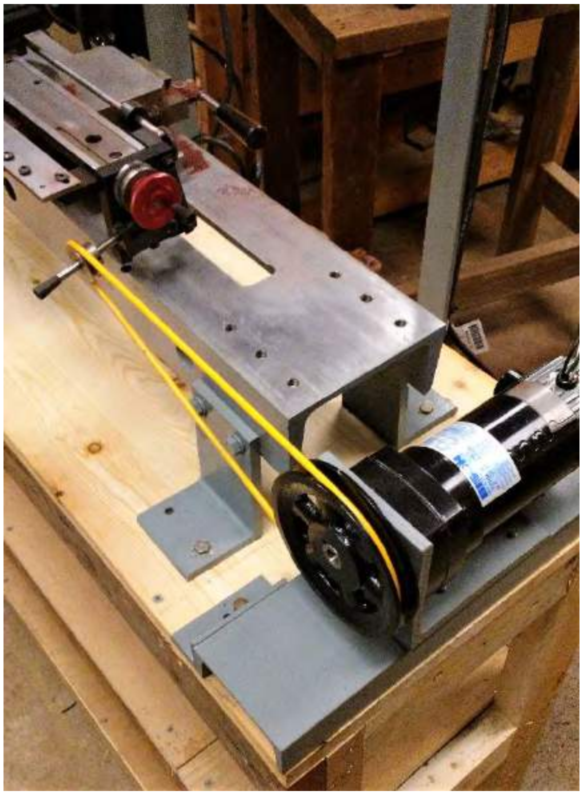



Geoffrey Saver's Finial Lathe

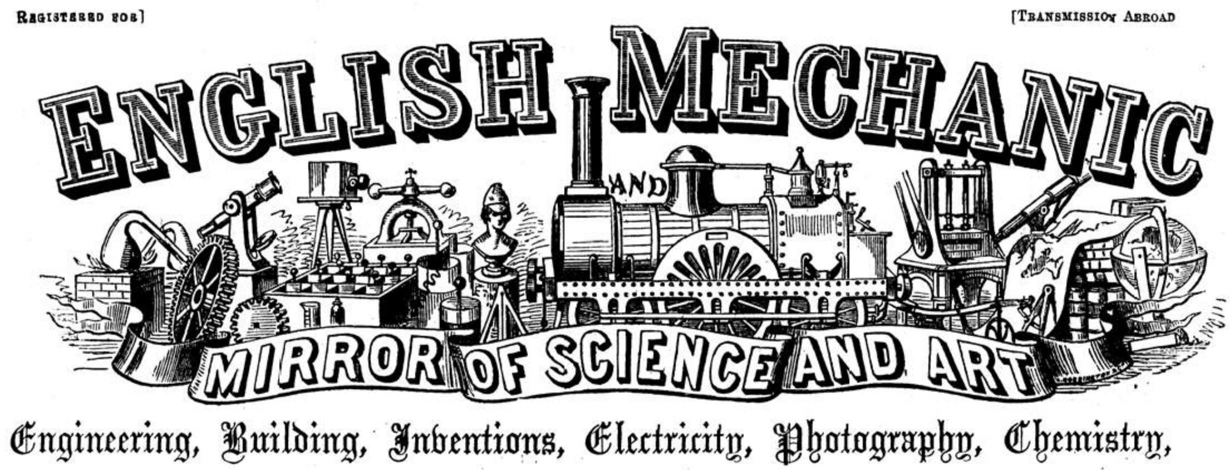
Here are some photos of Geoff's finial lathe which was inspired by Peter Gerstel's idea for a different way to cut simple finials.

Cutting a finial takes over an hour and the finial lathe frees up Geoff's rose engine for use in the meantime.



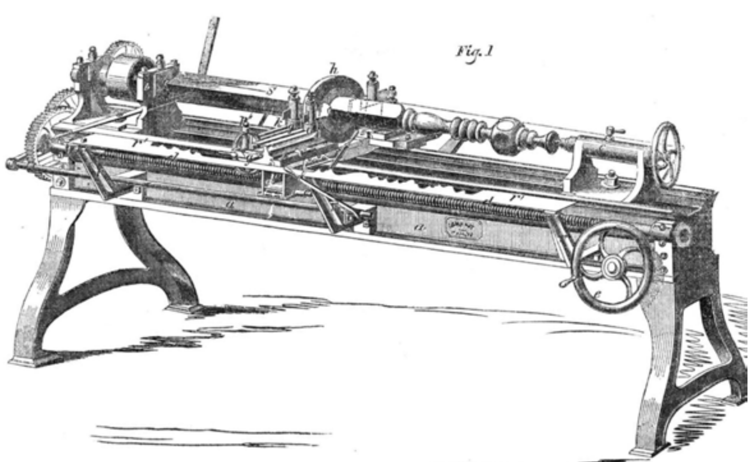


Classified Advertising



Courtesy of Eric Hutton, our club is fortunate to have a DVD comprised of:
Ornamental Turning: extracted articles and letters, 1865-1927.

We plan to select interesting excerpts to include in our regular newsletters and encourage the membership to consider the special offer below:
Issued weekly from 1865 to 1926, the English Mechanic was unique for its volume and variety of correspondence. Matters concerning religion, occult studies, orthodoxy, heterodoxy and absolute agnosticism jostled with discussions on the use of tools and lathes. Whether building your own steam engine, velocipede (early bicycle), motor car,or telescope, all came with detailed and costed plans.
On a (DVD) £24 or (3xCD) £26 including world wide airmail postage.Also the entire newspaper going back to Volume 1 is available as facsimile copies over 14 DVDs, normally £18 each or £216 a set, members of Ornamental Turners International can take advantage of the reduced price of £14 each or £168 for the set.
See web site www.englishmechanic.com



Fine cutting tools for ornamental turning

Crafted by Jon Spencer

Drills

The drills are made in diameters of 1/8, 3/16, 1/4, 5/16, 3/8, and 1/2"

Standard profiles are:

Angle *- 60, 90, 120, and 150 degrees*
Straight *- (Square)*
Ball *- (Convex)*
Oversize Radius *- Gothic or Bull Nose*
Ovolo *- (quarter round) - high or low amplitude*
Double and Triple Ovolo
Ogee *- cyma recta high or low amplitude*
Ogee *- cyma reversa high or low amplitude*
Pearling *- high or low amplitude*
Pearling *- nested pearl*
Step *- three to seven steps*
Custom variations and combinations of some of the drill profiles listed are available

Fly Cutters

The fly cutters are made in diameters of 1/8, 3/16, 1/4" and 1/4 with reduced 3/16" shank

Standard profiles are:

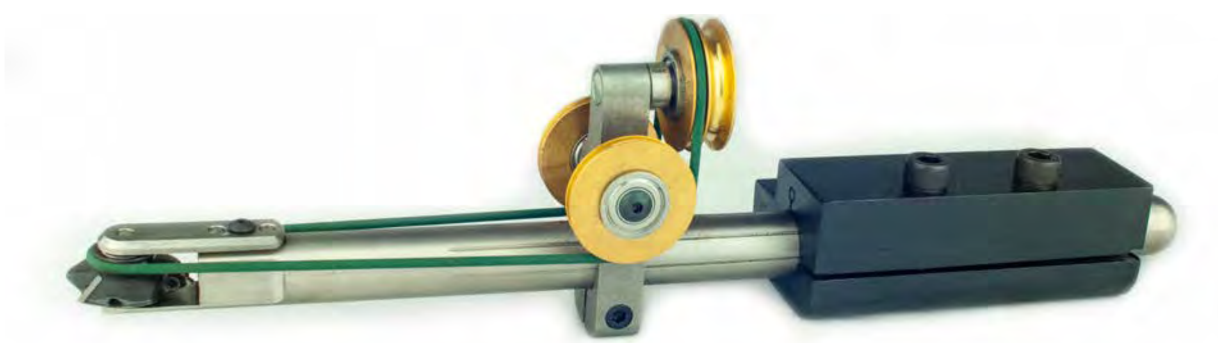
Single Angle *- 30. 40, and 60 degrees*
Double Angle *- 60, 90, and 120 degrees*
Straight *- (Square)*
Convex *- half round*
Convex *- quarter round*
Scotia
Concave *- half round high or low amplitude*
Concave *- quarter round (ovolo)*
Concave *- three eighths round*
Double and Triple Ovolo
Double and Triple Bead
Ogee *- cyma recta*
Ogee *- cyma reversa*
Step *- three to seven steps*

Custom variations and combinations of some of the fly cutters listed are available. All of these cutters are made of high grade Micrograin carbide, lapped to give the highest attainable finish cut. For a price guide or for more information, Email me at ***jspencer.co@gmail.com*** or ***www.facebook.com/cuttingtools*** or call **(570) 766-9876**

State of the Art Universal Cutting Frame

Carefully engineered after the style made prominent by Fred Armbruster, this delicate yet sturdy cutting frame incorporates a unique cutting head designed by Charles Waggoner with three carbide inserts set 120 degrees apart, each with three positions so that the cutting points can be rotated should they dull or become damaged. The cutting head dimensions are 0.95” x 0.63” allowing access to tighter areas. ABEC 5 high speed bearings are used throughout. Witness marks are prominent for positioning the cutting head at 45 and 90 degrees left or right as well as TDC. The adjustable 2mm Habasit drive belt is tensioned and a dual groove pulley will accept a standard 1/8” overhead belt drive. Equipped for approximately 6” cutting depth, you can create a shorter drive belt to set the cutting depth anywhere down to just under 2” if that serves your purpose. The cutting frame comes with a holder (shown) that fits into your quick change tool post.

$600 Contact Brad Davis at braddavis@netins.net.



Evans OT lathe from 1876

It has been rebuilt and is in fine working order. It has two boxes of cutters; I was told they are Holtzapffel cutters. There are well over 550 cutters. There is an Oval chuck, brass gears, cutting frames, fixed cutters, and brass jam chucks. There is also a tap for making adapters for the spindle, plus lots of other tooling for this fine working machine.

Steve White 636-346-0606 St. Louis, MO. $5,495.

Ornamental Tools

Our company is focused on producing and keeping in stock the best possible carbide tools for ornamental turners. Utilizing a state-of-the-art ANCA CNC grinding mill, we are able to produce tooling in the style of the famed Holtzapffel tools. These modern tools, however, are made from H600 carbide allowing for unsurpassed life and performance when compared to tool steel. After grinding in the ANCA, tools are inspected with a laser comparator in no less than 15 places to insure accuracy and quality. All tools are made in Massachusetts.

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High Quality Deckel Model SOE Grinder

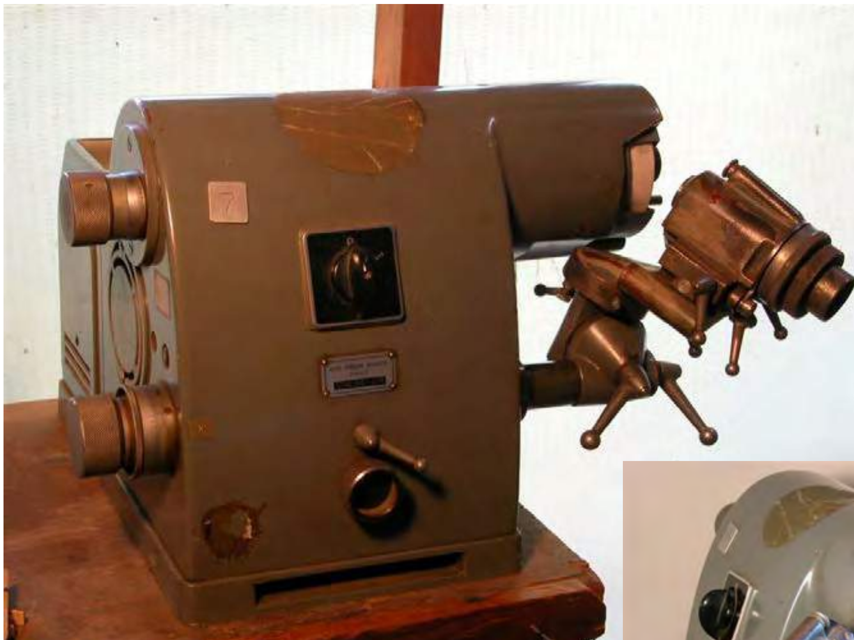


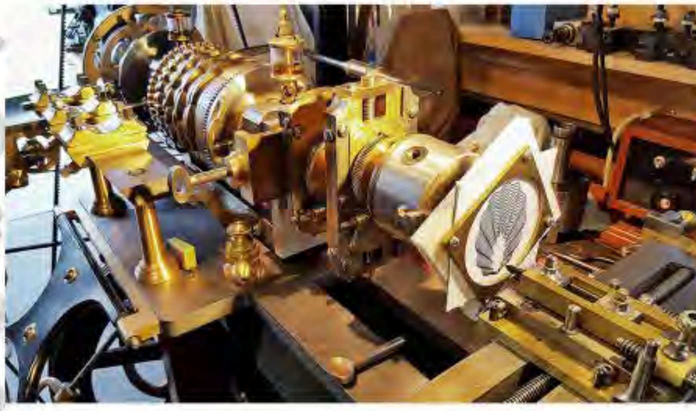
Plate on machine says:
ETS Friedr. Deckel Vaduz
SOE/66-458

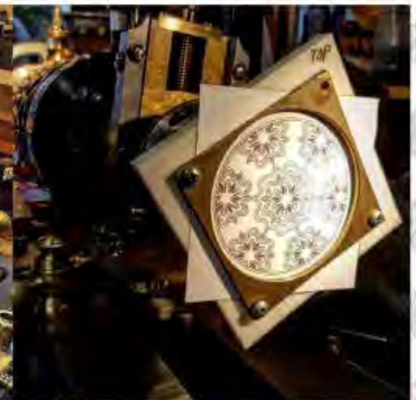
Comes with 9 collets, grinding wheel, wrenches, photocopy instruction manual, no floor stand. Motor 3/4 hp, 220 Volt, 3 phase, 4500 rpm. Weight is 145 lbs.

For more information, specifications, and pricing, see www.artcotools.com/deckel-grinder-model-soe-html They list this machine new at $16,050 and a 7 collet set is $600. I'm asking $1,800, plus shipping or pick it up.

Gene Sagerman gene@tidewater.net
P.O.Box 790, Waldoboro, Maine 04572
Phone: 207-529-5420

Sacred Geometry – 2nd Edition!
A 16th Century Coloring Book
Al Collins + Brittany Nicole Cox





After selling out of the first edition Al and Brittany went back to the drawing machine to create a new version of this unique book. In addition to the original patterns, we have added another 17, making 88 unique patterns.

This coloring book is a compilation of machine-drawn patterns generated on the MADE Ornamental Rose Engine Lathe.

The front and back cover are pressed with white and silver foil. The binding is spiraled white metal wire, allowing the book to lay flat as you color.

The book is printed on 180lb uncoated white paper – so your coloring utensils won't bleed through and colors stay true. This book is limited to 300 copies and is handmade here in Seattle Washington.

The book also doubles as an instruction manual. We've put together a book of recipes, which lists the steps for how to generate each pattern on the rose engine. This can be purchased as a supplement for $10 and includes the new patterns.

For those of you interested in the special edition – we will be releasing another set of 24 this October, which will be available for pre-order soon! This version will be signed by the authors & the MADE lathe team and comes in a hand dyed muslin bag with a MADE lathe enamel pin, a nickel silver guilloché spinning top, the book of receipts, and a few other extras!

Coloring Book: $30
Book + Receipts: $40
Available at:
https://mechanicalcurios.com/horological-books-more/

Guilloche Earrings by Don Kotur

The entire piece was made using a 2400 rosette / # 4 rubber [Lindow numbers]. The O.D. scallops were cut with a 3/16 down cutting carbide router bit to minimize any chance of a burr on the face. An Antares DG 125-1 diamond graver was used for the pattern which is 180 degrees out of phase with the scallops to provide room so the finding hole doesn't interfere with the pattern. The I.D. scallops were cut with an 0.080 burr with no particular phase relationship to the pattern. The pieces have a 3" hemispherical dome [1-1/2" radius] which rotates the I.D. scallops outward for better exposure.

A NOTE FROM YOUR EDITOR

As you read through this and future newsletters, please feel free to contact me with your questions, comments and suggestions on how the newsletter might be improved and made more useful to the ornamental turning community. Your thoughts will be most welcome.

Frank Dorion