~Making Fire & Water- Triple-Axis Turning~

w/ Eric Lofstrom- (photos by Fred Abeles)

How do I turn a triple-axis, sculptural piece? *The answer is through "EXPERIMENTING & PRACTICING with the INTENT TO LEARN". Enjoy the process of EXPLORING how curves interact with each other– stop the lathe frequently, using both eyes & hands to observe your progress. Understand that this piece is just practice for future turnings. Most of all* ***be safe*** *&* ***have fun****!*

My first year of turning focused on basic spindle techniques; turning pens, spurtles and spatulas, tool handles, candle sticks, etc. Spindle turning became synonymous with creating utility items. It wasn't until after I started turning fitted-lid boxes and hollow forms that my interest in turning artistic and sculptural pieces began to really open-up. Exploring different turning styles allowed me to develop tool control and emphasized the importance of *form* in my pieces. During this transition to emphasizing form, I read an article by Barbara Dill, published in American Woodturner, Fall 2007. This article changed my view of spindle turning entirely and opened my mind to the concept of multi-axis turning. What captivated my attention was the way curved facets interacted to form relationships, expressed as ridges of intersection. Multi-axis turning can be used to create absolutely fascinating forms!

Photo by Eric Lofstrom

My first multi-axis turnings were a mix of frustration and excitement; my skills and nerves were tested as blanks spun off the lathe, tool vibration gave me numb hands, and tension in my neck and shoulders reminded me of the events for days after. Persistence and a bit of stubbornness won out. Now, I look forward to the challenge and adventure of creating these multi-axis rain drops and flames. Each one is a unique sculptural piece. Experience has taught me the importance of sharp tools, gliding the bevel, and finessing the curve when attempting this type of turning.

Sharp tools? Some turners might argue that honing or stropping your tools is a waste of time. In this project, a sharp tool is an investment in sensitivity to how the wood is cutting. Your attention must be 100% engaged at the business end of the tool when turning a multi-axis project; anything which helps you "tune-in" to the cutting action of your tool will help

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you develop the precision needed to make a clean cut. I use an extra-fine diamond hone and a leather strop to give a razor edge for finishing cuts.

Gliding the bevel? The difference between *rubbing* and *gliding* the bevel is the amount of pressure directed into the wood. Rubbing the bevel during an intermittent cut will bounce the tool off the blank with each revolution, causing a ribbed surface and loss of control. Directing a cutting edge supported by the bevel gliding behind takes practice; do some warm-up turning to develop a light touch on solid wood before attempting that same cut on an intermittent surface. Multi-axis projects are great skill builders for learning to glide the bevel.

Finessing the curve? Sneaking-up on the final curve by using a series of light cuts gives you a chance to interact with the piece as it evolves. Taking fine cuts also allows you practice to rehearse techniques before your final pass, creating muscle memory through repetition.

Tools and Materials: Multi-spur drive center (7/8" diameter), a quality live center, a variable speed lathe (used to tune out vibrations and find a comfortable RPM), and a few basic spindle turning tools; ¾" spindle roughing gouge (SRG), ½ " spindle gouge and a radius-edge skewsized to match the project. Sanding disk mandrel (3" or 5" diameter) with appropriate grits of sanding disks and a #2MT drill chuck to mount the sanding mandrel in the headstock. You will also need a bandsaw or other means of safely removing waste wood once the piece is off the lathe.

Begin with a small/medium size blank, approximately 3"x3"x6", spindle grain orientation (for the photos I am using a longer block of straight-grained maple); my favorite wood for this project is figured maple or poplar because of the beautiful effects when using dye to accent the grain.

Photo 1. Mount the blank between centers (axis A), using a multi-spur drive. Using a SRG or thick cross-section skew, rough the blank into a cylinder and true up the ends.

Photo 2. While the cylinder is spinning between centers, use a pencil to scribe a circle approximately ½ the radius. Repeat on both ends.

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Photo 3. Remove the blank from the lathe and establish three new axes as seen in **Diagram 1** (B, C, and D) located on the newly scribed circle. Repeat on both ends. For this article the axes are parallel and 120 degrees from each other. Changing the orientation of axes to each other can give some very pronounced and interesting effects; keep it simple for your first project.

Diagram 1.

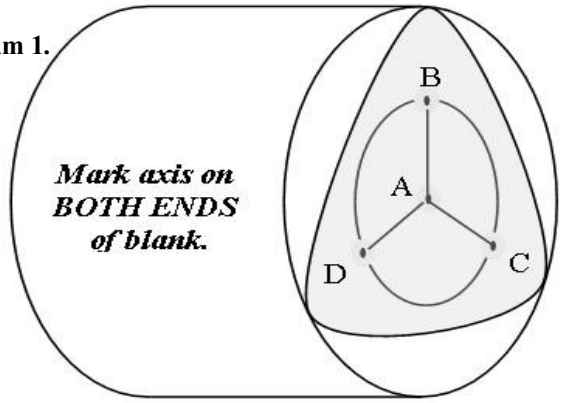

Photo 4. Select an axis (B, C, or D), mount between centers and rough turn the corresponding facet. Note: the facet will appear on the *opposite* side to which the blank is mounted.

Photo 5. Remove enough wood so the ridges or edges of the facet align with the other two axes. Repeat this process, mounting between each axis (B, C, and D) until the blank is roughed into a triple-faceted cylinder.

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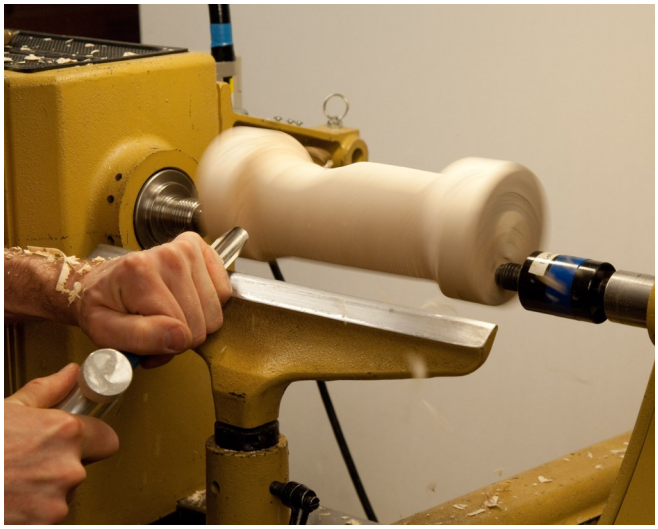

Photo 6. Mount on each axis (B, C, and D) and begin creating curves. For my raindrops, I usually designate one facet as a bead-cove combination and the other two facets as variations of elongated beads. Have fun exploring the interaction of curves, they create attitude and movement in your piece!

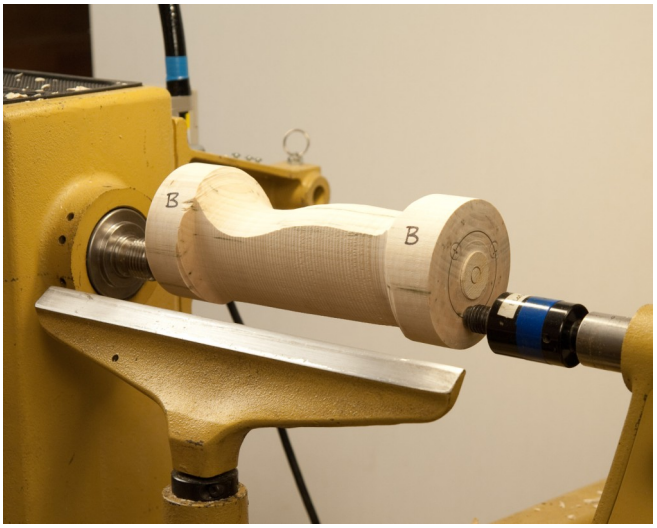

Photo 7. Observe how each ridge changes as the curved facets evolve. Remember to sneak up on each curve; stop the lathe frequently to observe the results. Creating two facets with similar curves will result in a very subtle curvature in the intersecting ridge; play with combinations of curves to see which effect appeals most to you.

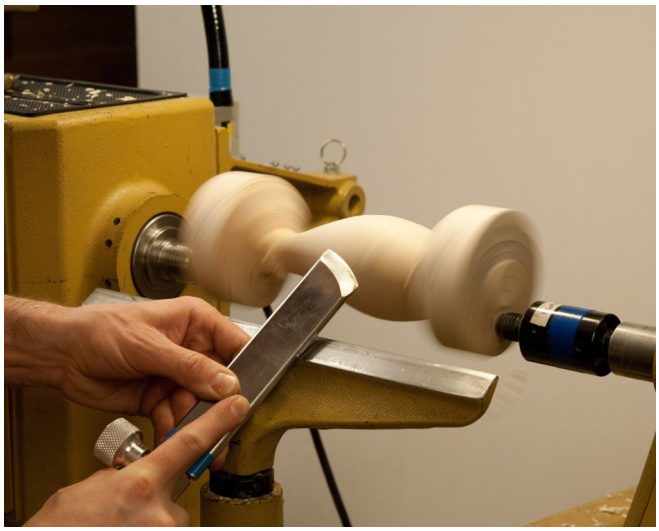

Photo 8. Now that you have roughed each curved facet, remount the blank on each axis (B, C, and D) a final time and refine the surface with an ultra-sharp tool to clean up any tooling marks. This is where gliding the bevel to finesse the finished surface is key.

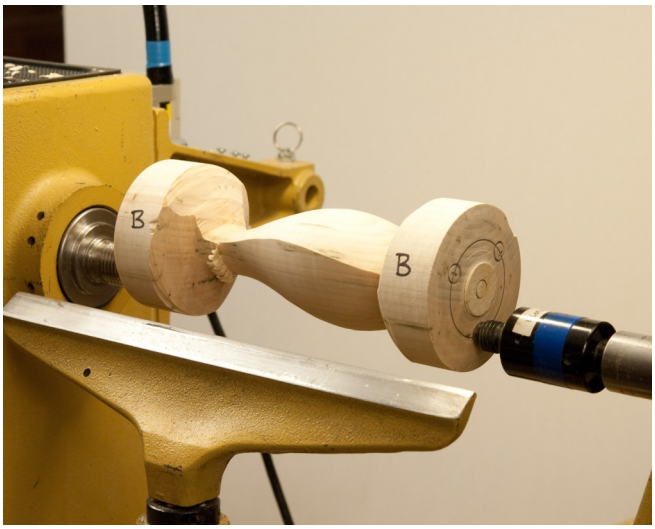

Photo 9. Stop the lathe frequently to observe the results. Notice the surface a razor sharp skew leaves behind requires little sanding. Sharp tools allow cleaner cuts and smoother curves while mounted between centers, requiring less sanding once the piece is removed from the lathe.

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Photo 10. When you are happy with the form and quality of each facet, mount the blank between center axis (A) to remove waste wood at either end. If you are creating a stand-alone form without a separate stand, undercut the base/foot slightly so your piece sits level.

Photo 11. Remove enough waste wood to make cutting on the bandsaw safe, but don't over-do-it! Leave a little extra so the curves can extend to a point; accidentally removing too much wood on the tip means that your piece will be shorter and will require more shaping off the lathe to adjust the curves.

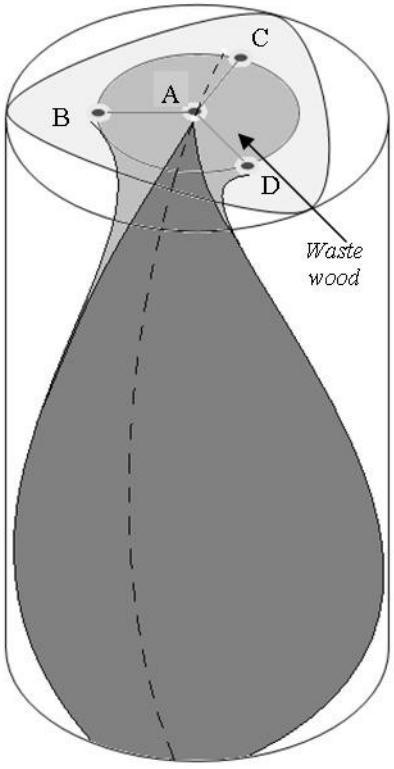

Diagram 2. Visualize where the facets and ridges come together as they project into the waste wood before you begin removing wood.

Photo 12. Use a bandsaw or other method to remove the waste wood and continue the curve of each facet to a tip. Remember to follow all safety guidelines and stay alert.

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Photo 13. Sand away any rough spots from the bandsaw and continue to refine the curves by blending in any tool marks. For smoothing curves, I prefer 5" hook-and-loop sanding disks held in a #2MT drill chuck. Sighting across the face of the sanding disk allows you to observe the curve and judge progress more accurately. I typically use 180-400 grit, then hand-sand with the grain using 600 grit.

Photo 14. Notice the attitude in this piece implies motion to one side. Using proper lighting and a contrasting background will help highlight any areas where the curved facets or ridges need more refinement. Continue refining until satisfied.

Photo 15.

Photo 16.

Photo 15 and 16. Some like the natural tones of wood, I like to experiment with color and other embellishing techniques. This project lends itself very well to embellishments; the finished size is relatively small and the ridges create a natural border for framing different colors or embellishments. Sculptural pieces are a perfect opportunity to make bold statements, so consider this an invitation to have fun finishing the piece; your choice of color and the final presentation of this project will determine whether "water" or "fire" is implied. **Photo 15** exhibits how blue, yellow, then a hint of red dye carefully applied in layers creates a deep aqua effect. A selection from the *Seattle Sunshine* series in Poplar Burl. **Photo 16** is an example of repeated applications of red & yellow, then the slightest hint of Blue dye applied in layers creates a flame effect. A composition piece of Maple Burl, named *Trinity*.

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Photo 17. Starting with primary colors (red, blue, and yellow) allows a wide variety of visual effects. Practicing your application technique on a white absorbent surface, like construction paper, will allow you to experiment with blending colors.

Photo 18. For this project, I prefer to spray dye onto the surface of the piece using chemical safe spray bottles; much like using a very large airbrush. As long as you keep the surface wet, colors can be blended on the surface before the solvent evaporates. Colors will appear differently on actual wood than on white paper, so practice on scrap wood before applying to your piece. Applying dyes to create impact with your work is an entire topic of its own, so I won't dive into details for this article. I encourage you to experiment & exlplore for now.

Photo 19. Once the solvent has evaporated, it's time to apply your choice of protective finish. Spray or wipe-on finishes can be used. Test the finish with a piece of dyed wood as some finishes tend to lift the dye when applied heavily during the initial coats. A gloss finish can be built up to mimic the look of glass, while a matte finish softens the look; a finish coat can really change the look of your piece, so experiment to find the look you're after.

Closing Comments: Turning triple-axis projects such as the water drop or flame will surely test your spindle turning skills, tool control, and finesse, while allowing you to create a truly sculptural piece. When playing with this style of turning, remember to keep 100% attention where the wood meets the tool's edge, keep your tools sharp, glide the bevel, and finesse the curve until you are happy with the finished piece. Most importantly, have fun exploring something new!

Sources:

-TransTint Analine Dye; Yellow, Red, Blue, Black (Homestead Finishes)

-Steb Center 7/8" (Sorby)

-Oneway Safety Drive Center (Oneway)

-Chemical Resistant Spray Bottles (U.S. Plastics Corporation)

~Spindle Turning Basics~

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ABC...*D'S of Controlling the Cut*:

A = ***Anchor*** *tool on toolrest.*
B = ***Bevel*** *glides across wood, directing tool.*
C = ***Cut*** *supported fibers when possible.*
D = *Direct attention ahead of the cut.*
'S = *Shavings are feedback on quality of cut.*

3+ Anchor Points = Stability

*Three points of contact (tripod) yields control & stability; 1)**toolrest**, 2)**body**, & 3)**bevel**.*

***Maintain bevel contact by steering the bevel where you want the tool to travel**.*

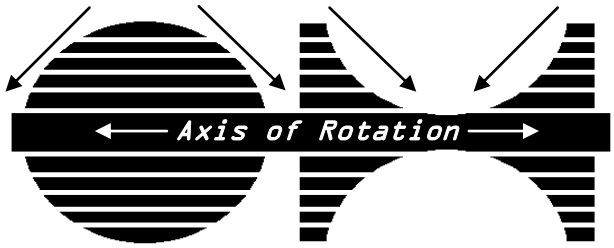
Cutting vs. Scraping:

- **Cutting** = Bevel glides across wood.
- **Scraping** = NO bevel/ relief ∠ contact; drawing the burr/ edge across the wood.
- ***Shearing*** = edge angle approaches parallel to surface movement of wood, *decreases resistance to the cut*.

Using a ***Shearing angle*** will result in the cleanest cut/ scraped fibers.

Cut when you can cut & scrape when you are unable to maintain bevel contact, or to refine the curve.

Grain Orientation Matters!



Fundamentally, wood is a bundle of straws; which flex & tear when there is no support behind them, resulting in torn grain or "tear-out". Cutting supported fibers results in less tearout!

Spindle Grain = fibers lay parallel to axis of rotation

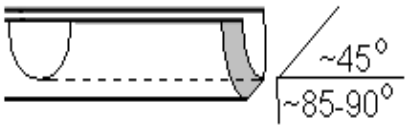
When cutting highly figured woods, grain direction varies - take light cuts & determine which way the wood cuts cleanest.

Two of *My* Spindle Turning Tools:

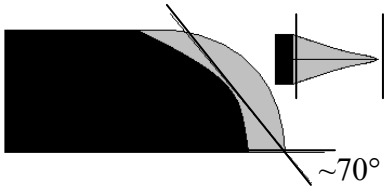
(sized appropriate to project)

- ***Spindle Roughing Gouge (SRG)***– *Used to rough-cut spindle to desired shape.*
- ***Skew***– *Rectangular shank, used to peel, plane, bead, V-cut, & pare ends of fibers.*

SRG- Spindle Roughing Gouge



Skew– radius edge & rectangular shank, bevel length ~1 1/2 X thickness of shank



Use profiles that work for you & KEEP YOUR TOOLS SHARP!!!