Timp Woodturners Association
Meeting Minutes
8 October 2008

The monthly meeting was convened by Vice President Stuart Davey at 7:00 p.m. in the Craft Supplies USA facility with about 25 people in attendance.

Stuart led the following discussions:

1. More volunteers are needed to man the Timp Woodturners demonstration booth at the Woodworking Show to be held Oct 23-25 in the Southtown Exhibition Center. Mini lathes will be provided but demonstrators will be expected to provide their own chucks, tools, and woods. Contact Kirk DeHeer to be added to the schedule of volunteers.

2. At the December meeting we intend to hold a top-a-thon competition. Members are invited to bring tops or other turned toys to donate to local children's hospitals or service agencies. We are also looking into the possibility of having mini lathes present at the meeting so individuals or teams can create tops or toys during the meeting. More details will be posted on the club website: www.timpwoodturners.org as they are resolved.

3. The Scera Arts Association of Orem have approached the club to see if we would be interested in staffing their youth woodturners program starting in January 2009 and following the AAW youth curriculum. They currently have five mini lathes donated by Timberline and are interested in expanding further. Craft Supplies has indicated an interest in supporting this program at some level. This type of program seems to fit nicely into the education elements of our club by-laws. A motion was made and carried unanimously that the club commit to pursuing this opportunity with Scera. Accordingly, we will pursue the issue and obtain more details and specifics.

Dale Dallon presented a demonstration on turning pull-string spinning tops in anticipation of the December top-a-thon. Notes and photos from that demonstration will be posted soon on www.timpwoodturners.org.

The meeting adjourned at about 8:30 p.m.

Respectfully submitted,

Dale Dallon
Secretary/Treasurer

Timp Woodturners Association
Demonstration Notes
8 October 2008

Turning Pull-string Spinning Tops

Demonstrator: Dale Dallon

A pull-string spinning top consists of three elements: the top itself, a holding fork, and the pull string. All three elements offer some turning opportunities with an almost endless range of options. In the simplest form the project is quite straightforward, but there are several design and production ideas that might be helpful.

(Photos can be seen at http://www.timpwoodturners.org/oct08.html.)

The physics of spinning tops.

The performance of a spinning top centers on stability and duration of the spin before the top tumbles. Stability is enhanced by keeping the center of gravity of the top low. A top-heavy spinning object will tumble quicker than a bottom-heavy object. Spin duration is proportional to the angular momentum achieved when initiating the spin. Angular momentum is dependent on the mass of the top, the distribution of that mass with diameter being a key factor, and the speed with which the top initially spins. A top made from heavy, dense material will develop more angular momentum at a given rotational speed than a top of similar size made from a lighter material. A top with more of its mass at the outer edge of its diameter will generate more angular momentum at a given rotational speed than a top of the same mass but with the mass distributed across a smaller diameter or more concentrated near its center of rotation.

The rotational speed of a pull-string top is established by winding a string around the stem of the top and pulling on the string to impart twist to the top. The speed achieved will be determined by how fast the string is pulled, not by how long the string is, and by the diameter of the stem around which the string was wound. This is the same principle that is applied to alter lathe speed by changing drive pulley diameter. For example: a stem with a 3/8 inch diameter has a circumference of about one inch. If a string wrapped around that stem is pulled at 20 inches per second it will generate a rotational speed of 20 revolutions per second, or 1200 rpm. However, if the same string were wrapped around the circumference of a top with a diameter of 2.5 inches, or circumference of about 8 inches, and pulled at the same 20 inch per second speed it would generate a rotational speed of only 2.5 revolutions per second or 150 rpm. The message is: a top with a large body diameter and mass but as narrow a stem as strength permits will be a real hummer.

The same principles apply with simple finger-twist tops. I have found it more difficult to spin a twist top with a 3/8 inch diameter stem and 2.5 inch diameter body than a twist top with a ¼ inch diameter stem and a 2 inch diameter body simply because it was more difficult to generate sufficient rotational speed with my fingers when spinning the larger top.

Preparing blanks.
In this demonstration I used a 2.5 x 2.5 x 3 inch silver maple blank for the top and a 3/4 x 1.5 x 6 inch poplar blank for the holding fork. The top blank was prepared simply by cutting a tenon in one end to fit into dove-tail jaws of a chuck.

Preparing the holding-fork blank is a bit more complicated. The hole to receive the stem of the top is first drilled completely through the width of the blank with a 3/8 inch bit. This hole is centered on the narrow edge of the blank about ¾-7/8 inch from the end of the blank. A second hole is bored through the thickness of the blank with a ¾ inch Forstner bit. This hole will provide clearance for the pull string when it is wound on the stem of the top. The hole should be centered on the width of the blank with the hole center about 1 inch from the end of the blank so it is just a bit further inside the fork than the 3/8 inch hole. Finally, a square tenon is created on the end of the blank to be gripped in pin jaws. Since I used ¾ inch stock I took care to have the tenon ¾ inch on each side and centered in the width of the blank. The tenon is easily cut on a band saw or with a dove-tail saw.

Turning the Top.
Since the width of the holding fork was to be 1.5 inches, I chose to make a stem 1-7/8 to 2 inches long. I also prepared in advance a stem-diameter gauge by drilling a 3/8 inch hole in a waste block with the same bit used to drill the holding fork. The top blank was mounted in a chuck and I penciled a reference mark at 1-7/8 inches from the free end. Using a ½ inch spindle gouge I turned the entire blank to a 2.5 inch diameter cylinder. I then used the ½ inch and 3/8 inch spindle gouges to turn the free end of the blank down to a cylinder just small enough to pass through the stem gauge freely the entire 1-7/8 inch length of the stem. I drilled a small hole through the stem with a 3/32 inch bit. This hole is to receive the end of the pull string when winding the top and the size was dictated by the string chosen. The hole was at the approximate center of the stem, but could be placed anywhere as long as it will end up inside the open portion of the holding fork.

With the stem at the free end, the upper surface of the top is accessible for decoration and finishing. I chose to decorate this top with an upper profile like a 3-tiered wedding cake with each tier only about 1/16 inch high. This was done by using the small gouge, or a skew, to make successive straight cuts from the edge of the top body toward the center and stopping the cut at the desired tier diameter. The stem, upper surface, and body circumference were then finish sanded.

To add color, I used opaque pigment markers to paint two of the upper tiers and the circumference of the body. I left the third tier unpainted to show the natural color and grain of the maple. I have not experimented with any other markers, but the ones I used were called “Permapaque” and were obtained at a Roberts craft store. I found the intense primary colors, red, green and blue plus purple covered better than the more subtle orange, pink, and aqua. I also found I got the smoothest coverage by hand-turning the spindle rather than running the lathe on low speed. It is sometimes necessary to make

more than one application to eliminate streaks, but the paint dries almost instantly so recoating on the lathe is convenient.

After completing the stem and decoration I removed the top from the chuck and installed a pin-jaw chuck. The top was remounted on the lathe with the stem gripped in the pin jaws. Ensure the top is inserted all the way into the chuck so the upper surface of the top body is tight against the ends of the jaws. Any gap will result in vibration when cutting the bottom surface of the body. The bottom surface was turned with the 3/8 inch spindle gouge. I chose to use light, straight, chamfer cuts so the bottom was a true cone ending in a sharp point. The bottom was finish sanded and the completed top removed from the lathe.

Turning the Holding Fork.
The square tenon of the holding-fork blank was mounted in the pin jaws and the tail stock was brought up to the center of the other end to center and stabilize the blank. I used the ½ inch and 3/8 inch spindle gouges to turn the handle of the fork to a cylinder and round off the shoulders and edges of the holding fork coming as close to the chuck as was prudent. I then sanded the cylindrical handle, the shoulders and the outside edges of the fork. To decorate the fork handle, I chose to roll a couple of beads: one at the end of the handle and one near the shoulder. The tail-stock quill was moved away to allow light finishing cuts at the end of the handle. The beads were given a light sanding and the fork was removed from the lathe.

At this point, although it was not demonstrated, the holding fork would be taken to the band saw to open the mouth of the holding fork. A cut down each side of the square tenon ending at the tangent of the ¾ inch boring produces a U-shaped mouth. I mounted a 5/8 inch diameter sanding drum in the pin jaws of the chuck and sanded the inside surface of the mouth to smoothness. I also sanded off the ridges on the outside edges of the fork that I couldn't reach with the gouge while the fork was mounted in the chuck. I then used the sanding drum to round off the corners and upper and lower edges at the end of the fork and to ease the inside edges of the mouth. This completed the holding fork.

The Pull String.
I favor a limp cotton string that will conform easily to the small diameter of the stem. The length of the string is not critical. An adult can handle a string up to three feet long, but two feet is probably a better length for children. The tip of the string must be hardened in some way to prevent fraying and to facilitate threading the string into the hole in the top stem. This must be done without creating a ball or lump at the tip that enlarges the string diameter. I found an easy way to do this was to dangle the string vertically, allow a drop of thin viscosity C/A adhesive to drizzle down the string and immediately spray it with a shot of accelerator. The thin C/A absorbs into the cotton quickly and forms a hard segment with no enlargement of the string. Use a sharp knife to cut through the hardened segment to leave a hardened tip about 3/8 inches long.

I have found placing a bead at the opposite end of the pull string provides two benefits: it provides a convenient hold when pulling the string and it provides sufficient weight when

the string is dangled to keep a light tension on the string thus facilitating winding the top. A bead turned from a nice wood is also esthetically pleasing. In my model I turned several beads from a 1 x 1 inch blood wood blank. The only tip I can offer is to drill a hole of the same size as the hole drilled in the stem of the top through the center of the blank before turning the bead. The string, with a hardened tip, can be threaded through this hole easily. I would also suggest drilling a slightly larger hole part way through the bead so a figure-eight knot tied in the outer end of the string can be pulled into the larger hole and trimmed off so no string shows outside the bead.

Dale S. Dallon