Mastering the Art of Hand Thread Chasing

By Mike Peace

Hand thread chasing is a traditional technique in woodturning that allows turners to create decorative and functional screw threads on wood. Hand thread chasing requires precision and a bit of patience but is so much fun! This technique has been used for centuries, dating back to when woodturners crafted everything from everyday items to ornamental pieces with threads. In this article, we will explore the essential aspects of hand thread chasing, including the tools, techniques, and tips for achieving success.

Understanding the Basics of Hand Thread Chasing

At its core, hand thread chasing involves using specialized tools, known as chasers, to cut threads into a piece of wood while it is mounted on a lathe.

Thread chasers for wood come in various pitches with 10, 12, 16 and 20 threads per inch (TPI) being the most common. The choice of pitch depends on the size and purpose of the project and the wood being used. For instance, finer threads (higher TPI) are often used for delicate, decorative items, while coarser threads (lower TPI) are more suitable for functional objects like boxes or lids that require a secure fit.

Most chasers are made from M2 HSS with one cutter for cutting external threads (the "male" chaser) and another for internal threads (the "female" chaser). Most come as a pair of separate tools. The Carter and Sons chasers (12 or 16TPI) come as one piece with a cutter on each end. I like this convenience of having just one tool. Carter and Sons thread chasers are made of the harder M42 steel and hold an edge longer than M2 HSS.

I recommend starting with 16TPI as a good compromise size for hardwood boxes with 12TPI a close second. 20TPI is too fine for most domestic wood, but works well on synthetics. 10TPI chasers have to traverse the wood twice as fast as 20TPI chasers and remove more material so are harder to learn and take more skill to use. The 10TPI threads can look rather coarse and industrial if used on smaller boxes.

Selecting the Right Wood

The success of hand thread chasing largely depends on the type of wood used. Some of the best woods tend to be imported exotic woods. Dense, close-grained, slow growing hardwoods such as

boxwood, lignum vitae, and African Blackwood are ideal for this technique. Someone referred to these as “uranium enriched” woods because they tend to be pricey. These woods provide the necessary strength and density to hold the threads without tearing or crumbling. Softer woods, or those with an open grain, are generally not suitable for hand thread chasing, as they tend to produce weak and unreliable threads or crumble when being cut. Some turners have success stiffening the threads with CA glue or sanding sealer. Some domestic woods that I have been successful with include:

- Mountain mahogany,
- Osage Orange,
- Dogwood,
- Fruit wood like Bradford Pear and apple,
- Holly,
- Hard maple, and
- Mountain Laurel

Non-Wood materials can work well because of uniform density and lack of grain structure.

- Corian,
- synthetic ivory,
- acrylics and plastics

It is also essential that the wood is well-seasoned and free from defects such as knots or cracks. Any imperfections in the wood can compromise the integrity of the threads and lead to failure during the chasing process. The grain needs to run parallel with the lather axis. Cutting threads in cross grain blanks does not work because the wood movement will cause the pieces to go oval and lock the pieces together when the humidity goes up! My best tip for turners just starting to thread chase is to buy a 2”x2”x12” blank of wood known to be excellent for thread chasing ($$$) and practice until it is gone! This will eliminate a major variable when learning. Some turners find inexpensive Schedule 40 PVC pipe useful for initial practice.

Setting Up the Lathe

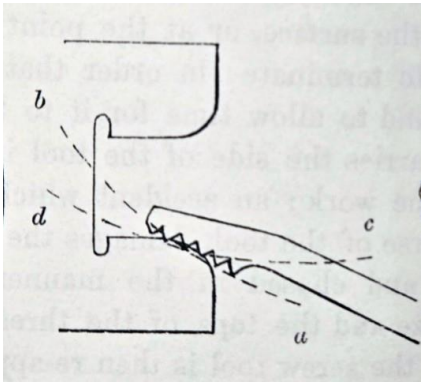
The lathe should run at a relatively slow speed, typically between 200 to 450 RPM to allow for better control over the chaser tools. I find that 300 RPM lathe speed gives me a comfortable rate of travel (CRT) for me to move and control a 16TPI chaser. If I use a 12TPI chaser at 300 RPM I am going to have to move it faster than I am used to or can comfortably control. So I slow the lathe down to about 240 RPM to get the chaser moving at the same CRT I would use with a 16TPI chaser. Conversely, I could speed the lathe to 400 RPM and get the same CRT with a 20TPI chaser. Changing the lathe speed to accommodate a different thread pitch allows me the ability to be consistent in how I move the chasers with a different pitch.

The top of the tool rest must be smooth and polished to allow the chaser to slide as easily as possible. A short tool rest with a hardened rod that does not require maintenance is ideal so the chaser will slide smoothly without catching on nicks. Cast iron or soft steel tool rests may

require some maintenance with a file and sandpaper to make smooth. A light application of candle wax along the rest can also help the smooth travel of the chaser. Proper tool rest height is also important. Typically, the tool rest should be set just below center height, allowing the chasers to cut efficiently on center.

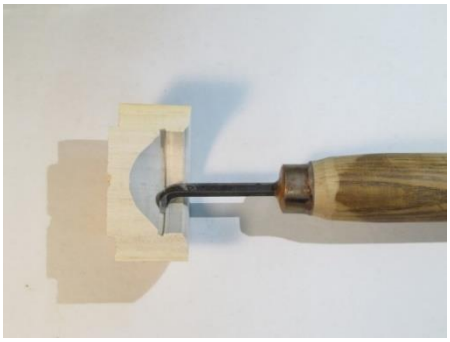
The Technique: Chasing Threads by Hand

The process begins by preparing the wood surface where the threads will be cut. This surface should be smooth and cylindrical, with a diameter slightly larger than the intended thread size. Do not sand the wood as imbedded grit can dull the chasers. The chasers should rest comfortably on the tool rest, with the teeth engaging the wood at the correct angle. The corner of the wood to be struck needs to have a 45 degree chamfer or be slightly rounded on the corner edge for both inside and outside threads. The initial strike is at a 45 degree angle on male and a bit less on female threads.
External threads are easier for most turners to cut than internal so I recommend starting your practice with external threads. However, we typically start a threaded project doing the interior threads first. It is easier to recover from mistakes with external threads. If the external threads are not cut properly, perhaps by getting a double thread by moving the chaser to quickly, or become wavy, known as "drunken" thread, the wood can be shortened and the thread cutting can be started again.



Chasing Internal Threads

1. **"Strike" the Thread:** Begin by positioning the tool inside the opening where the threads will be cut, holding it at a slight angle. Make a few practice dry run motions to get the feel for the speed. With the chaser moving, gently bring it into contact with the rotating wood in order to "strike" the thread. You should engage the third or fourth tooth on the chamfered corner at the mouth. The tool must be kept parallel with the floor or you risk altering the thread pitch.



2. **Make a Recess or Stop Gap:** You will need to create a recess where the threads will end. For most projects, you want to shoot for about 5 complete internal threads. This will provide some margin for error to make adjustments for grain alignment. The recess needs to be a bit wider and deeper than the threads. This stop gap gives you time to remove the chaser before the tool bottoms out and rips your threads. Even better than a recess, for internal threads, is chasing into open space like a collar or hollow out beyond where the threads will end.

3. **Advancing and Refining:** As the threads begin to form, advance the tool gradually changing the angle as shown in the illustration, from a-b to c-d until finally parallel with the axis of the lathe. Maintain consistent pressure. Multiple passes will be needed to refine and deepen the threads until they are fully formed.

4. Is an armrest necessary? Many turners are able to do fine without one when cutting threads. An armrest is certainly not needed when cutting threads in a collar for an urn or hollow form when cutting straight into an open space when there is no need for a recess.

Chasing External Threads

1. **Size the tenon:** Before chasing the male thread, you must get the size right for the male tenon. With calipers, measure the female recess and lock in this setting. Using this measurement, turn a 1/8" long spigot where the male threads begin. This short spigot should fit snuggly in the recess against the interior threads. The surface of this spigot is now a reference point that will eventually be the bottom of your male thread. To the left of this spigot, establish a new level with a diameter increased by the depth of the male threads.

2. **Strike the First Thread:** With the handle raised and the chaser teeth parallel with the chamfer, with the chaser moving gradually, make the initial contact to "strike" the thread.

3. **Make a Recess or Stop Gap:** As with internal threads, cut a recess or stop gap with a recess tool after a full thread is struck in case of a bad initial strike. This makes recovery a lot easier if you create "drunken" or double threads with the initial "strikes."
4. **Advancing the Tool:** As with internal threads, slowly advance the chaser tool along the wood's length, maintaining consistent pressure. It is important to keep the tool moving at a steady pace to ensure even thread spacing and depth.

5. **Refining the Threads:** After the initial cuts, make several passes with the chaser to refine the threads. Each pass should remove a small amount of material, deepening and smoothing the threads until they reach the desired depth.
6. **Shorten the threads:** After trial fitting successfully, you may need to use a scraper against the face to shorten the threads as only 2-3 threads are necessary.

Conclusion

Hand thread chasing is a rewarding skill in woodturning. While it requires practice and patience, mastering this technique opens up a world of possibilities for the woodturner. By understanding the tools, selecting the right materials, and honing your technique, you can achieve beautifully crafted threads that enhance your woodturning projects. Whether you're creating a finely threaded box or adding a finial lid to a hollow form or urn, hand thread chasing is a valuable skill that adds a touch of craftsmanship to any piece!

If you want to watch a video on thread chasing check out this **video** on my YouTube channel.

This article was written for Carter and Sons Toolworks who sell woodturning tools including threadchasers.