What you need to know about threading in wood

Kurt Hertzog explains about threading in wood

KURT HERTZOG

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As you make your various creations in wood, you may run into situations where you wish to have the ability to assemble or disassemble multiple pieces, open and close things securely yet repeatedly, or fasten your turnings to something else in a removable manner. The natural solution to all of these is that threads be included in your turning in some manner. The needs for size, pitch and strength may vary, but the ability to use threaded fastening solves so many needs that it behooves us as woodturners to be able to add threading to our skill set. The three methods I know of are simply: thread the wood, embed or fasten pre-made threads to your turning, or add material to your turning that is more conducive to taking and holding threads than the wood itself. Let's explore some options we can use to create the threaded function.

Inherent grain considerations

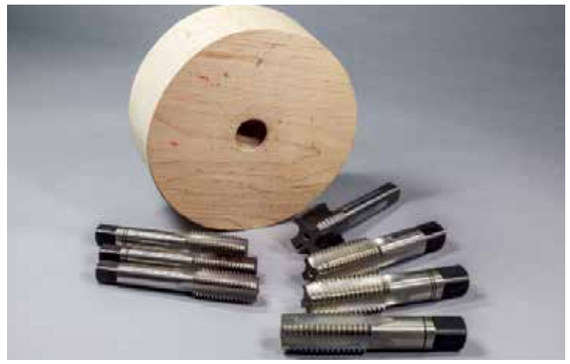
The simplest, yet sometimes the least desirable is to thread the wood itself. This is fraught with problems simply because of the material properties. If we think about the orientation of the wood fibres in either spindle or faceplate orientation, both present problems. Threads cut into a spindle-orientated piece of wood have the fibres of the wood cut into short little pieces bonded together only by their lignin bonds. The threads and especially the peaks of the threads are very fragile regardless of the pitch because of the short fibre lengths and limited bonding strength. Threads done in wood in the faceplate orientation might have some additional strength in the face grain portions of the rotation, but the entire thread function is susceptible to changes in roundness, causing binding or sloppy fit. Even fine-grained woods that are well cured can have their shape changed with varying humidity conditions and stresses. When planning threads cut directly into wood, select the denser, fine-grained woods. I find that African blackwood (*Dalbergia melanoxylon*) or boxwood (*Cornus florida*) lend themselves to the best threading. Both are costly, but you can also insert a small quantity into the key locations as needed for economy. More on inserting materials for threading later on.

Even without sharp 'V's on the threads, wooden threads are very vulnerable to damage

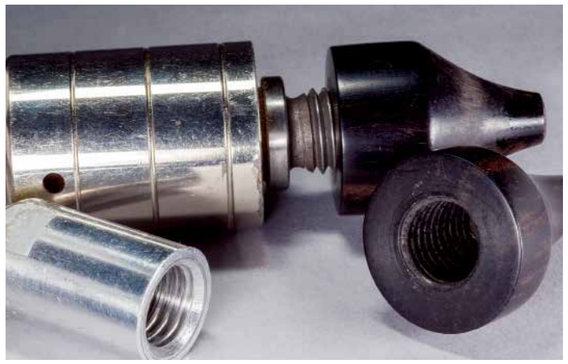
Faceplate orientation cut threads also have challenges. The fragility based on grain orientation along with roundness changes

PHOTOGRAPHS BY KURT HERTZOG

Threading wood directly



Woodturning retailers usually have the headstock and tailstock taps, which allow for direct mounting of work or making fixtures



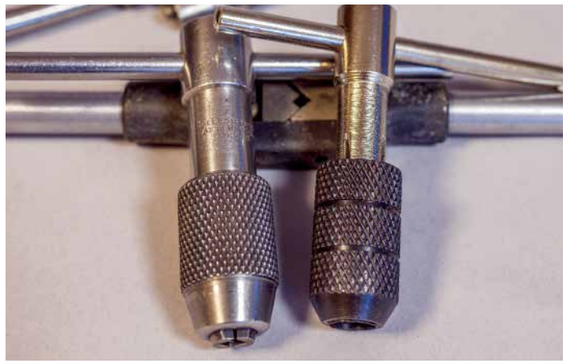
My tailcentres all have a ¾-10 threading, allowing me to make many tailcones, mandrel savers, adaptors and hold 6mm shaft items

The penmakers among you know the many thread sizes that pens use. All difficult to find for purchase. Pen by Brian Gisi

The pen taps and dies are available but only by special order. Along with special order and low volume comes very high prices

Threading wood directly can be easily accomplished using the traditional taps and dies that are readily available in the machine tool suppliers trade. There are some taps that woodturning retailers stock but they tend to be the thread combinations used for mounting work. You'll often find taps for M33, 1in-8, ¾in-10, etc. These will allow you to easily mount items to the headstock threads or tailcentre threads directly. Not as frequently found is the mating die for those threads. Since our focus is on 'assemble-able' and 'disassemble-able' threading points, we'll need both the tap and die function to match. I do have high-quality machine tool taps and dies but not nearly in the wide assortment of sizes you can get in large combination kits from the discount automotive suppliers or economy machine tool retailers. There are also 'non-standard, standard' taps and dies. These non-standard, standard sizes are almost never found in the usual sales venues, but need to be specially ordered from select manufacturers. They are a little used standard for specific applications such as the barrel and cap on a fountain pen. An odd, little used thread size that is always used in this application. There are only a couple of these sizes to choose from.

The very inexpensive tap and die sets are available in metric and unified. They will be more than serviceable in wood

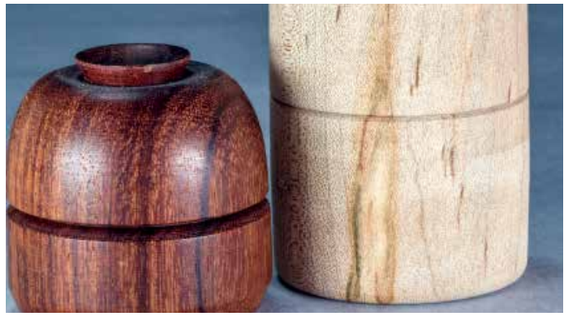


While the kit contents aren't Starrett quality, they will work well. You usually use the chuck in the lathe and hand turn

The large combination of tap and die assortments sold through the discount automotive shop or machine tool sales venues provide inexpensive taps and dies sets that are fully serviceable in wood. Perhaps their lesser quality would have limited life in metals, but they are certainly functional and economical in wood. I buy them when they are on sale or with a discount coupon and keep them in the wood shop for use there. Remember, regardless of the diameter and thread pitch, you are at the mercy of the density of the wood you are working with.

Be certain to thoroughly degrease the taps and dies before using on wood. The preservative oils used prior to their overseas shipment can cause you finishing problems if it finds its way to your wood. I don't degrease the entire set, but rather use denatured alcohol to degrease the individual pieces prior to use. These taps and dies are used on wood exactly as you would on metal. A machinist's look-up chart will give you the correct diameters needed for either the tap or the die to work effectively. Turn or drill, as appropriate, to the given dimension and use the tap or the die. Not as critical as with metal, but certainly good form is 'breaking the chip'. That is, advance the cutter a short way and back the tap or die off slightly. This will allow the curl(s) being cut to break and be shed rather than clogging things up. Don't be afraid to totally extract the tap or die and begin again after clearing the work and tap or die of debris. Just be cautious to start on exactly the same start point to continue the existing thread rather than create a new one and destroying the original.

Learning to hand chase threads in wood is not difficult. The huge advantage of hand chasing threads diameter independence



One of the challenges of threaded tops and bottoms is making the grain match. There are some tricks for lidded boxes

One way to improve thread life in softer woods is to not cut the threads to a sharp peak. Leaving the thread flattened will help

You may have immediate need for tapered threads, but hand chasing allows you the capability to cut any size and angle you wish

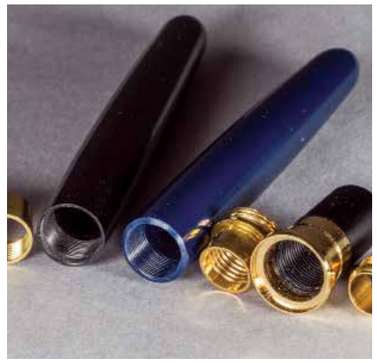
An alternative to taps and dies is hand-chasing threads. While a bit more challenging, it can easily be mastered with a bit of time and practice. The huge advantage that hand-chasing threads has is being diameter independent. Rather than selecting a threading based on diameter and pitch, you can select the pitch and make the diameter any size that suits your threading needs. This is quite convenient for larger diameters as taps and dies get enormously expensive once you get beyond fractions of an inch. Dies are far more costly than taps when the sizes get larger but both are expensive. Both Crown Hand Tools and Robert Sorby make thread chasing tools. Years ago they were available in pitches from 12-20 threads per inch. I've had mine for many years so the current range of thread pitches available might be more limited. It is beyond the scope of this article to teach you how to hand chase threads but there are many great tutorials on the method and ways to practice in order to develop proficiency. I remember a booklet on the subject by Allan Batty. It is an excellent resource that I used when learning. The beauty of hand-chasing threads is not only the freedom to choose your own diameter, but also the ability to easily cut tapered threads. Tapered threads are a bit more of a challenge but not too difficult once you've mastered the basics of hand chasing.

There are also threading attachments that will cut threads using the lathe or a stand alone fixture in the indexing and workholding mode. Most use Foredom or Dremel-style rotary tools with a cutter installed to cut the standard 'V' threads. The diameter is set by adjustment of the threading attachment mechanism. The pitch is indexed to provide the proper final thread. These threading fixtures or attachments provide the advantage of adjustable diameter with a fixed pitch. Cost is their major downfall along with setup time.

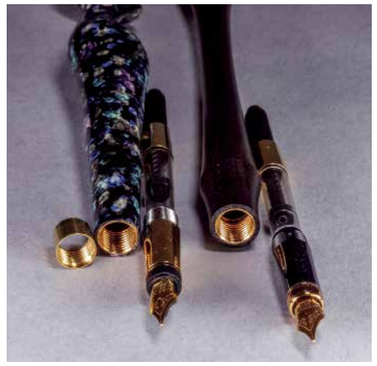
KEY POINTS ON THREADING WOOD DIRECTLY

1. Dense, fine-grained woods lend themselves to threading directly
2. Both spindle and faceplate orientation present problems with threads
3. Larger sizes can be cost prohibitive with traditional taps and die pairs
4. Hand-chasing threads provides infinitely selectable diameters
5. Pitches from 12-20 threads per inch are most suitable for wood
6. Stabilised wood or addition of CA adhesive can strengthen threads

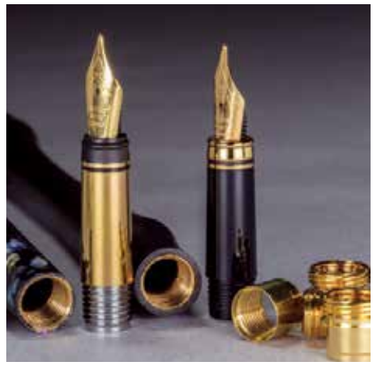
Embedding pre-made threads



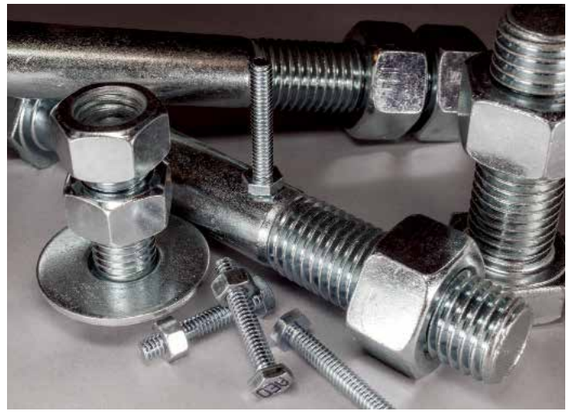
Fine pitched threads can be taken from old pens, scavenged kit parts, or other items and embedded as needed in your turnings



Using kit parts made the custom pens possible. The metal threaded sleeve was embedded allowing for thin walls with strength



Even if you don't make pens, grasp the concept. You'll find plenty of sources for inside and outside threads by just looking around



For larger and higher demand applications, I use steel or brass nuts and bolts. Wide array of sizes at a modest cost

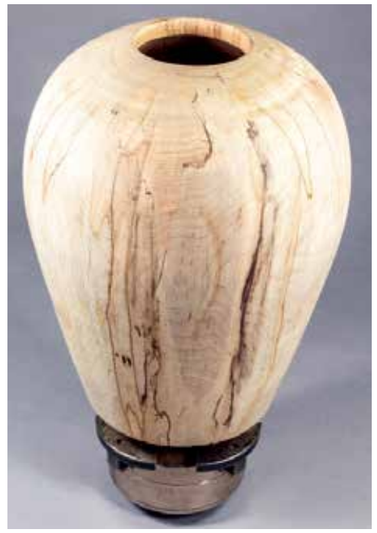
Even if you are using higher strength materials, remember your wood, mounting depth and method may be much weaker

Skipping the threaded items that you simply use while completing any particular kit, let's focus on using some of those threaded components in one of your own applications. Because wood isn't particularly conducive to being threaded, especially finely pitched threads, I often use moulded or metal pieces with threads from kits to embed into my other turnings. These inserted threads might not have incredible strength, but they do have the ability to be fastened and unfastened many times without wear or damage. Being readily available, I often use them for my low strength needs. When there is need for higher strength from the threaded fastener portion of the turning, I resort to the standard steel nut and bolt. Lengths of threaded rod, called 'All-thread' in the US, are readily available in many different thread sizes from home improvement centres and hardware stores. Modestly priced and available in three or six foot lengths, it is ideal for use where the length from a bolt cut off isn't sufficient. My nearby full service hardware store can provide high strength nuts and bolts in sizes ranging up to two inches in diameter, as well as the metric hardware in the same range. These sizes and strengths aren't often needed for turnings but they are very handy for home built faceplate mounting systems. When using the steel nuts and bolts for the threaded portion of the turning, be certain to consider the embedding methods, strengths of the adhesives and surrounding wood strength. There is no purpose in having a grade five or grade eight piece of hardware embedded only 12mm deep in a piece of poplar *(Liriodendron tulipifera)*. Always remember that the maximum strength of any chain is the weakest link. I highly recommend that you avoid putting strenuous demands on any of your fasteners as used in your woodturnings. Those who are doing sculptures or high weight, high leverage applications are in a different class than what we are discussing here. They will need to focus far more on safety. For the hobbyist with the need to take their awkward yet reasonably weighted turning apart for shipping, always be aware of the strength of the wood surrounding your fastener as well as the mechanics of insertion and methods of securing. Using metal fasteners is only for the purpose of size, convenience, and durability for repeated use.

KEY POINTS ON EMBEDDING PRE-MADE THREADS

1. Inexpensive fasteners are usually low quality and low strength
2. For better fits and longer durability, select the most appropriate hardware
3. The long-term needs of the application dictate the fastener materials
4. Method of embedding, depth, fastening method and wood itself all impact final strength
5. Kit components are often good sources of low strength threaded fasteners
6. Use fasteners in wood for cosmetic or convenience fastening, never in critical applications

Inserting better threading materials



A great spot for better threading materials or insetting already cut threads. This urn will look good with a tall slender finial

Because the wood itself is often the problem, let's explore how to put better threading woods or other materials into the needed location. It really is a continuation of embedding threads. Rather than embedding a fastener itself, let's embed something that will take and hold threads nicely. This will not only provide for a wood-to-wood thread that works smoothly, but is serviceable throughout the life of the product. Boxwood *(Buxus sempervirens)* threads marvellously, but it has many drawbacks in use. Availability, maximum size, cost and colour are the usual reasons for not making your entire project from boxwood. However, if you need to put a threaded function in your turning, embedding a small piece of boxwood in the area where threads are needed works well. Using only a small piece, size and cost become manageable and you can usually hide it from immediate sight.

You can embed better threading materials or thread them prior to embedding. Far easier to err with the matching thread sets beforehand

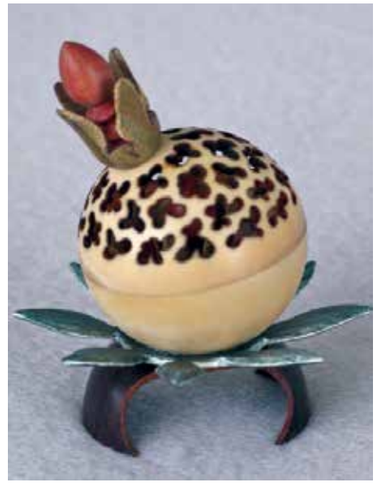
You then thread the boxwood as needed to mate it to the other portion of your turning. You might have an embedded piece of boxwood there as well or it might be of a species more conducive to threading. I've often seen this on funeral urns where the hollow vessel is a beautiful piece of burl with a blackwood finial. The blackwood will thread well, but the burl may not. By embedding a small piece of boxwood in the throat of the urn, the threads needed can be created without any compromise of the beauty and colouration of the final product. This can be applied to lidded boxes as well. If you want a beautiful threaded top and bottom of the box, you can inset a small piece of boxwood into the body for threading and address the threading capability of the top by material selection or insert.

Of course, if you are fortunate enough to make the entire lidded box from boxwood, you'll have no issues at all. We've focused on boxwood, but your use of hard, dense woods that will thread better than the parent material is always your choice. Plastic inserts to receive the threads work quite nicely. An inset piece of plastic is very easy to thread with a fine pitch if needed and has sufficient strength to be durable. Corian is a great choice. You certainly have the option of pre-threading your boxwood, Corian, or other material and embedding it as detailed above. A clever way that hasn't seen much traction over the years was a method I learned long ago from Petter Herrud. Petter used to cast epoxy into a pocket specifically cut to receive it. It was positioned exactly where he wanted the threads to be. By casting the material to be threaded into position, he had the best of both worlds. He had a material that would thread nicely, exactly where he wanted it but also had an easily repaired insert if the threading process goes awry. Because this process usually involves hand-chasing to have the variable diameter selection, there is always the opportunity to mess things up when cutting the threads. If you mess up your threading in an embedded block of boxwood, you need to cut the boxwood away and embed another piece or change the thread diameter. If you don't create an acceptable thread in your epoxy inlay, you simply cast over it and repeat the process. No need to cut it all away and start over although you certainly can if you wish.

Conclusions

Lidded boxes often have threaded tops. Funeral urns almost always have a threaded lid or finial to provide for access to the inside. Obviously, the walking cane kits have threads to allow for shorter turned sections and breakdown for storage and travel. Some of the more not-so-obvious threaded turnings are larger pieces that need to travel. Being able to disassemble things and pack into more convenient shipping containers is a very important advantage. Fastening woodturnings to other objects is easily accomplished via threaded fasteners. You can apply threading to an extensive and diverse array of turnings. Custom pens, lidded boxes, funeral urns, walking canes, awkward sculptural type turnings and more lend themselves. If you think about your own turnings, I'm certain there are things that lend themselves to threading. The many methods you can use to install threads should give you an option that will meet your needs. If you'd like to learn to hand-chase threads, go ahead. It is a very satisfying event when you are successful. If you are more inclined to get to the end point without that particular challenge, you've seen several methods that allow you to create the threaded function quite simply. Once you've used it once with success, I'm certain you'll be incorporating threads into more of your turnings. ●

Once you start thinking of threads, you'll find applications. Of course, you can create hand-chased threads just for the fun of it



A collaborative piece with Anthony Harris, which was made many years ago. Not much that wasn't threaded