

# THREAD WRAPPING ON THE LATHE PART 1 BASICS

Contributed by: Tom Wilson

A.K.A "Jolly Red"



This tutorial was downloaded from

<http://www.penturners.org>

The International Association of Penturners - 2016

# THREAD WRAPPING ON THE LATHE - PART 1 BASICS

By: Tom Wilson AKA Jolly Red



This is Part 1 of a 2-part article on wrapping thread decorations on spindle turning projects. Part 1 will cover "base wraps", and Part 2 will cover making "cross wraps". It is highly recommended that you read Part 1 before reading Part 2, since the concepts in Part 1 are used in Part 2.

The techniques I found for thread wrapping is for building and decorating fishing rods, and the reference books below are about that craft. Since we are doing projects that are much shorter than a fishing rod, the tools and procedures need to be modified somewhat from rod building, but the basic idea is the same. The wrapped patterns from the rod builders can be used directly on wood turning projects, they just don't need to be as long as is used on a fishing rod.

Any spindle oriented project with a central hole through it can be decorated, whether or not it has a brass tube in it. The wrapping can also be done directly on a brass tube, then cast in resin, and many fine examples of this have been shown on the IAP forums. The following is on how to use a turned wood blank with a brass tube in it, and applying the wraps to that blank. All the blank needs is a central hole completely through its length to hold it on the mandrel. The wrapping can be done directly on the surface of the blank, but I prefer to make a shallow groove in the blank to keep the thread flush with or just below the surface of the blank, which is the method discussed in this article. I believe this to be the simplest, least expensive way for a person who wants to try thread wrapping to get started.

These can be made from any material used on pen blanks, and they are prepared exactly the same way you normally prepare the blank. The only requirement to accommodate the wrapping is that the blank needs a straight section to place the thread. The length of the wrap can be whatever will fit on the blank and allow you to develop your design. If a groove is used it needs to be as deep as or slightly deeper than the combined thickness of the thread layers. To make the groove, after turning the profile on the blank, I will mark the ends of the groove and make a "stop cut" there with the toe of a sharp skew to ensure the end of the groove is square and clean. Sanding to 320 grit is done prior to making the stop cut. This will prevent rounding over the corners of the groove while sanding.

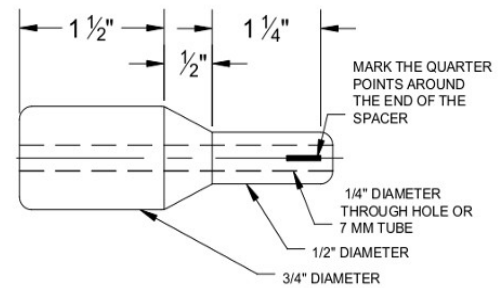
After sanding use a tool with a square end, such as a parting tool, to clean out the material in the groove and leave a flat bottom. This depth is not an exact dimension, and is gauged by eye. Practice on spare blanks, dowel rod, or cut offs to get a feel for the depths to make these. Sanding with paper finer than 320 will remove any pencil marks and remove any "fuzzies" from the stop cut, without significant rounding of the corners of the groove. If any "fuzzies" are left, they can snag the thread and make wrapping more difficult.

While wrapping, some sort of mandrel is needed to hold the blank and a way of holding and rotating the mandrel is required. Your pen turning mandrel and lathe can fulfill these requirements. By using custom spacers on the mandrel and slipping the belt off the pulleys in the lathe to allow free rotation, a very usable set up can be made. If the tube is bigger than 7 mm, use the kit's bushings to mount the tube on the mandrel, or make tapered spacers. If your lathe is difficult to turn by hand with the belt loose, putting on a large face plate will give extra leverage to turn the spindle with less effort.

The photo shows my pen turning mandrel set up for wrapping a slimline pen made for the Freedom Pen Project. On the mandrel are two spacers which are big enough in diameter to allow for a good grip while wrapping. I made mine as shown in the following sketch. The narrow portions of the spacer will be used to do cross wraps which will be described in Part 2. Otherwise, they give you a little more room to work. The narrow portion needs to be at least as big in diameter as the outside diameter of the blank, so additional spacers will be needed for bigger projects. The one shown here will work for projects with up to 3/8" tubes.



LATHE SET UP FOR WRAPPING THREADS



"SPACER" FOR WRAPPING

I use a "mandrel saver" to hold this under pressure, but if you don't have one of these, any extra space can be filled in with homemade spacers and bushings. Apply enough pressure to be sure the assembly will not come loose while wrapping. Also, always support the outboard end of the mandrel to reduce the possibility of bending the mandrel. A bent mandrel will not affect the wrapping, but would ruin the mandrel for its primary purpose of turning projects. If you already have a bent mandrel, it can be used for this to prevent the possibility of bending a good one.

If you do not want to use a pen mandrel, a length of 1/4" all-thread can be held in a Jacob's chuck or a collet chuck, using nuts and washers or a mandrel saver to apply pressure. If using a live center, make a depression in the end of the all-thread for the nose of a live center to support the outboard end. Also, if the central hole in the blank is less than 1/4", smaller diameter all-thread can be used as a mandrel in the manner described above. As the mandrel gets smaller, it is more likely to flex during wrapping, so the tension on the thread being wrapped needs to be lessened accordingly.

As an example, I use #8-32 all-thread as a mandrel to wrap lace bobbins, which have an outside diameter of just over 1/4". A 1/4" hole through this would not leave much wood to wrap on. Just keep the all-thread as short as possible to decrease flexing of the mandrel.

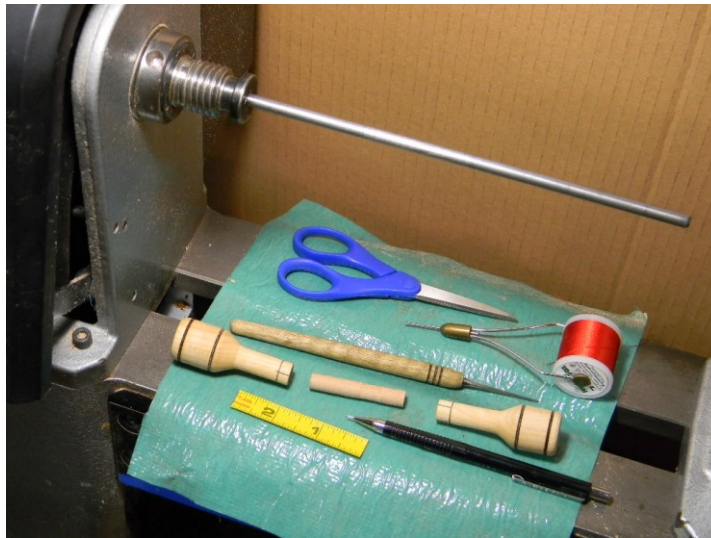
One very important thing to keep in mind while wrapping is to keep tension on the thread at all times. The amount of tension required is an individual matter, but I use fairly light pressure. Wrapping the thread too tightly will make adjusting the threads more difficult when that is needed. There are several ways to apply tension. The simplest way is to keep the spool of thread in one hand at all times and keep the tension on the thread by pulling on it. The only problem with this is when you need to do something that requires two hands.

One way to keep tension on the thread when you let go of the spool is to hang a weight on the thread. An alligator clip with a small weight is easy and cheap to make, and will work. The teeth of the alligator clip can be wrapped with tape to keep from fraying the thread and give a better grip.

A better way is to use a "bobbin holder" which will hold a spool of thread. These are quite popular with fly tyers, who wrap thread under tension to hold their materials on the hook. When allowed to hang under the mandrel, the weight of the spool of thread and the spool holder will provide enough tension to keep the thread tight. It is also easier to hold the spool of thread in the holder than in the bare hand.

### TOOLS USED FOR WRAPPING THREAD ON A PEN.

Starting at the top, scissors, bobbin holder with spool of thread, thread tool, spacers with blank to be wrapped, ruler and fine point pencil.



The thread I use for wrapping is either nylon, trilobal polyester, or rayon, all of which can be found at sewing stores, hobby stores, and many big box stores. These are embroidery threads, and I use size #40. (This may also be called size D, 30, or 130 denier - thread has been around for a long time and has lots of sizing standards. All of these are about the same diameter, and will work together.) This size thread will give a smooth appearance once wrapped and finished. If larger diameter thread is used, the individual threads are easier to see, and give a somewhat different appearance. I prefer the smooth appearance of the smaller thread, you may differ. I also sometimes use metallic threads, to add a little glitter to the designs. Regular polyester thread is not a good choice, as this will often get "fuzzy" when the color preserver is applied. I have not tried any other threads so cannot give an opinion on them. Of course, you can get any color you can ever need in any of these threads. Unless you are going to do a lot of wrapped projects, just get the smaller spools, in the colors you need, to cut down on cost. One spool of thread will make a lot of wraps.

Another supply that is needed is color preserver. Color preserver will keep the other finishes from penetrating the thread and making it translucent, which allows the colors below it to show through. This can be purchased or you can make your own. To make your own, mix white glue with water till it is the consistency of milk. Elmer's school glue is inexpensive, easy to find in small quantities and works as well as anything. This can be stored in an air tight bottle till needed, its shelf life is till it hardens in the bottle.

Thread is also available in "ncp", which means that "no color preserver" is required. This is available from the rod wrapping suppliers, and can be used if desired. I do not use this as I already have the regular threads and do not want to expand my inventory (and cost). Also, the color preserver has to be used when cutting the ends of the threads used to make cross wraps, to hold everything together when the excess threads are cut off. One last thing, these threads are made to be used in sewing machines, and may have a lubricant on them. This can cause finishing problems unless they are sealed with the color preserver.

A necessary tool is a way to cut the thread, such as a razor blade or a pair of sharp scissors or nippers, which ideally would have sharp tips to cut the thread close to the wraps. A good example of these would-be embroidery scissors. You could also use a razor blade or very sharp knife to do the close cutting, and less delicate scissors for the other cutting.

One tool which is not strictly necessary but which is quite useful is a thread tool, which is a stiff, heavy needle with a handle. It allows getting in to adjust individual threads, and the smooth shaft allows closing gaps in the wraps. The one I use came from Mud Hole tackle and cost about \$2.00.

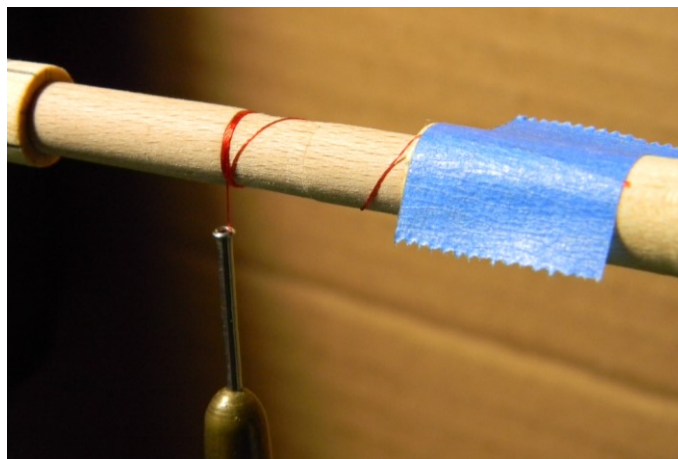
I removed the red plastic coating it used for a handle and put a wood handle on to make it more comfortable to use. If you do not have one of these, a bamboo skewer would work quite well, it just wouldn't be as durable. Also, your thumbnail will work quite well, if it is kept smoothed with sandpaper or a nail file.

Another "tool" to make yourself is a "thread puller", which is used to complete base wraps by pulling the end of the thread under the completed wraps to lock the end in place. It is a piece of thread or thin nylon monofilament (I use 6 lb Trilene) tied to make a loop. I like to tie a bright red bead on the end of the puller away from the loop to hold onto when pulling, and to make it easier to find when I drop it on the shop floor.

Most of the other supplies and tools will probably already be in your shop or readily available. These include masking tape, small paint brushes, sand paper, etc.

The pen shown in this article is for the Freedom Pen Project, and is a Slimline from Penn State Industries. The wood used for this one is Beech, I also made them from Honey Locust, Walnut and White Oak for this year's batch. The decoration is to be red, white and blue stripes.

With the blank on the mandrel and the mandrel mounted in the lathe, it is now necessary to wrap the thread on it. I wrap a base of white thread first to prevent the color of the wood from affecting the color of the following wraps. (In the following photos, I used red thread since it shows up better than the white). This will also brighten any threads wrapped over it. This base wrap is a continuous wrap which will completely cover the area being wrapped. For this discussion, I will be wrapping the thread from left to right in a groove. Just reverse the directions when you want to wrap from right to left.



### **STARTING THE WRAP.**

Thread taped to the right of the groove, spiraled to the left end of the groove, and wrapped over itself several times. The bobbin holder is hanging free and maintaining tension on the wrapped thread.

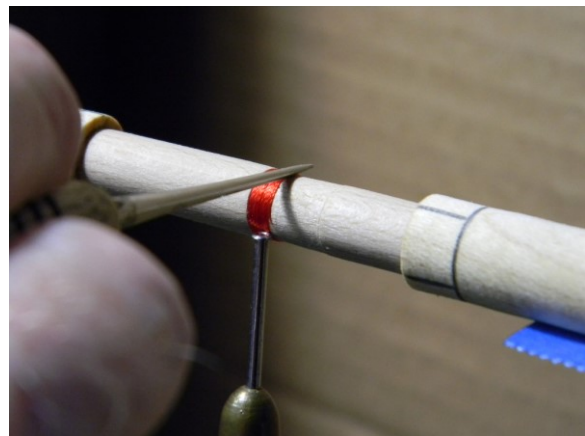
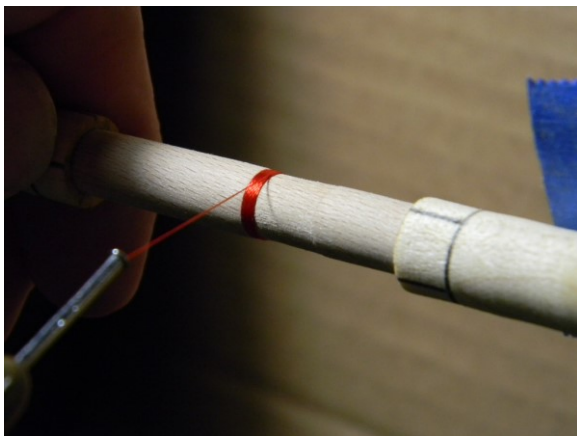
First, tape the thread on the blank to the right of the starting point, with the end of the thread pointing to the right. Leave about 1/2" or so of space between the tape and the start of the wrap. Hold the thread spool in your left hand and stretch it at an angle towards the starting point, then start turning the mandrel with your right hand to wrap the thread in an open spiral to the left. I turn the mandrel so the top of the mandrel goes away from me, so I can see the thread as it winds onto the blank. When the thread reaches the left end of the groove, bring the thread perpendicular to the blank and continue turning the blank with the right hand.

This first wrap of thread should be tight against the side of the groove. It may take a few tries to find the correct angles to hold everything for this to work; also, don't pull the thread too tight or you will pull it loose from the tape, but do maintain tension on the thread. After one complete revolution, the thread will start to cross itself. Just as it starts to cross, the thread will want to follow the original thread direction and not cross over itself. Just lift the thread slightly and ensure it does cross over itself. This will lock the thread onto the blank.

Once the thread has been wrapped over itself four or five times, the tag end can be untaped and cut off close to the completed wraps. **DO NOT RELEASE TENSION ON THE THREAD TO DO THIS OR THE WRAPPED PORTIONS WILL COME LOOSE.**

If any gaps are showing in the completed wraps, use your thumbnail or thread tool to push them back together. This closing of gaps will be an ongoing process throughout the wrapping. We want to end up with a continuous layer of thread, with no gaps or overlaps, completely covering the bottom of the groove.

Now continue wrapping the thread, which can now be in either hand, with the other hand turning the mandrel. To keep the thread wraps together as you wrap, hold the thread so it is angled slightly to the left. This will cause the thread to snug up against the previous wrap. Some practice is required to find the correct angle, but it will save time and effort in the long run.



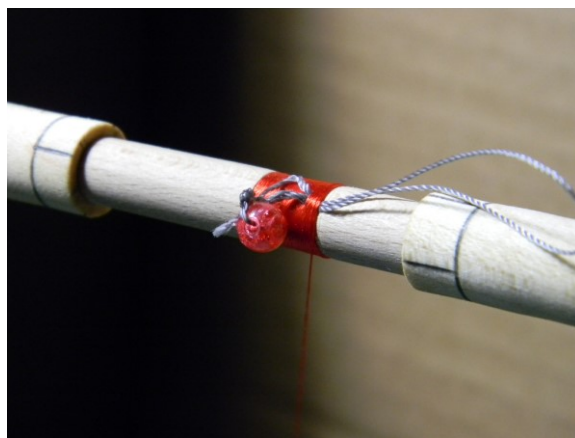
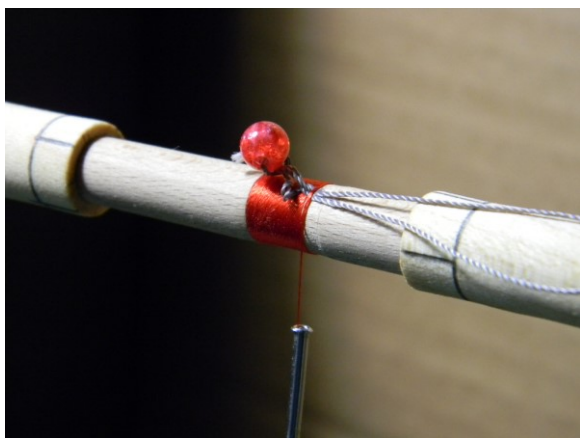
### **CONTINUING THE WRAPS AND TIGHTENING THE WRAPS.**

Showing the first few wraps and using the thread tool to push the thread wraps tight to eliminate gaps in the wraps.

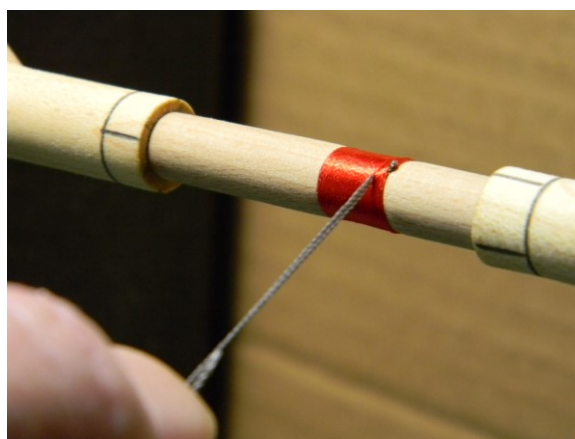
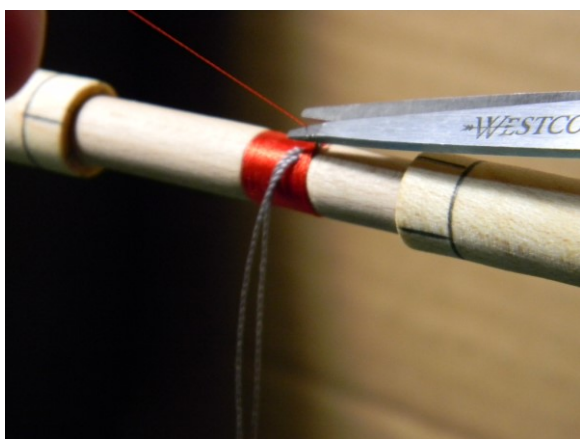
When you have wrapped to within about 8 or 10 wraps from the right end of the groove, it is time to start the tie off the thread. Place a thread puller on the blank, laying it under the last wrap of thread, then slide it under the thread to hold it in place. The end of the thread will eventually be pulled to the left to finish the wrap, so the loop needs to be to the right, with the bead to the left. Continue to wrap till the bottom of the groove is completely filled with thread and there are no gaps. Hold the thread in place over the puller with the left thumb, then release the tension on the thread. Cut the thread, leaving an inch or more of thread hanging free.

Put the end of the thread through the loop of the puller, now apply tension on the thread with the right hand, and remove the left thumb from the puller. Pull the puller with the left hand till it is holding the thread snug against the completed wraps. Be sure the thread is securely trapped by the puller before pulling it snug, or you will have to unwrap 8 or 10 wraps to start the tie off again. You can now release the mandrel with both hands and the thread will stay in place. Trim off the tag end of the thread close to the puller, leaving 1/16" or less of thread showing. Now pull the puller at a 45-degree angle to the left to pull the tag end under the previous wraps, thus locking in the thread.

Doing it this way will usually leave the end of the thread under the wraps. If the end of the thread is showing, carefully separate a couple of the threads over it to expose the thread underneath. Using a sharp knife or razor blade, trim the tag end, and pull out the trimmed thread. Then close the gap over the thread end to hide it.



CATCHING THE PULLER WITH THE THREAD AND THEN WRAPPING OVER THE PULLER TO THE END OF THE GROOVE



THE END OF THE THREAD CAPTURED BY THE PULLER AND READY TO BE TRIMMED, AND STARTING TO PULL THE THREAD UNDER THE LAST WRAPS TO SECURE IT

Before applying the color preserver, inspect the wrap to see if there are any gaps in the thread. If there are any, they can be closed by rubbing back and forth over the gap with a hard-smooth object, such as the shank of the thread tool.

The final step is to apply a coat or two of color preserver. Just be sure to thoroughly soak the thread with the color preserver. I like to do this with a small red sable paint brush. Try to keep the color preserver off the wooden part of the blank, so it will not affect the rest of the finish. Allow this to dry thoroughly and the blank is ready for the decorative part of the thread wrapping.



## APPLYING THE COLOR PRESERVER TO THE WRAPS AND FREEDOM PENS IN VARIOUS STAGES OF BEING WRAPPED.

For the Freedom Pen Project pen blank I am showing here, the decorative design is bands of red, white and blue. The groove is  $\frac{3}{8}$ " wide and each band is  $\frac{1}{8}$ " wide. Normally, I will wrap the second layer of base wraps in the opposite direction of the first base wrap. This will help prevent the second layer from getting gaps from trying to follow the "grain" of the first wrap. It also makes it easier to close any gaps in the second wrap. I marked out the design by placing a mark with a sharp pencil at each  $\frac{1}{8}$ " along the length of the groove, simply measuring the spaces with a ruler. Then I started the red band at the left end of the groove and wrapped to the  $\frac{1}{8}$ " mark. The white band went from there to the  $\frac{2}{8}$ " mark, and the blue band filled in the remaining  $\frac{1}{8}$ ". Each band was started and ended using the same methods as the base wrap. The final step was to coat the bands with color preserver. This would be a good design to start with, as it is simple to do, and is good for making Freedom Pen Project pens.



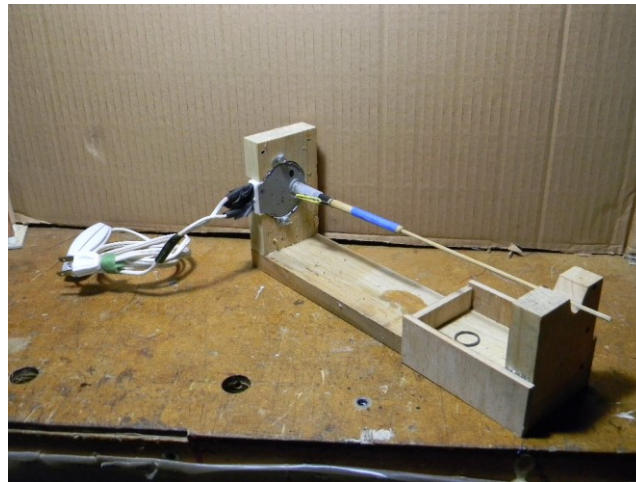
### MARKING THE SPACES FOR THE RED, WHITE AND BLUE BANDS

Once the wrapping was finished, I used lacquer to coat the threads and finish the rest of the pen. Sometimes I will use epoxy to cover the threads and the rest of the project, especially if the threads are in a part of the pen which will be gripped. Sometimes I may only apply epoxy to the groove, sand to smooth it, then coat the entire project with a film finish. I use epoxy to cover the threads and the rest of the blank because it can be applied thick enough to prevent the user from feeling the texture of the thread, which may become uncomfortable if writing for a length of time. Either way requires the groove to be deeper than the thread, to allow for sanding the epoxy.

The type of epoxy used does make a difference. The 5 minute epoxies are not to be used, as they do not allow enough working time to apply, and they will turn yellow over time. Epoxies with a working time of 15 minutes or longer need to be used. These have to be mixed according to the manufacturer's directions, and allowed to cure overnight or longer before more work is done on them. Mix carefully to avoid air bubbles forming. Only mix enough epoxy to coat one blank at a time, as even the longer open time epoxies may become too "stiff" to use before more than one or two blanks can be coated. Once the epoxy starts to set, it cannot be used without leaving a very poor surface, which may or may not be correctable.

Cool weather will give more time to work with the epoxy; during very warm weather, it may not be practical to use epoxy at all, as even the longer pot life epoxies can set too fast to do even one blank. I also like to put a few drops of 91% rubbing alcohol in the epoxy while mixing it. I think it allows for better flow out of the epoxy and helps release the air bubbles that form during application. I apply the epoxy with disposable brushes I get at Walmart (30 brushes for \$1.00) and throw them away after one use. If a sticky surface develops on the cured epoxy, this can be removed by wiping it off with 91% rubbing alcohol, which is cheaper and less toxic than denatured alcohol. 91% rubbing alcohol can also be used to clean up uncured epoxy.

If using the epoxy one special tool is absolutely essential to success. The uncured epoxy needs to be rotated constantly while it is curing or it will flow to the bottom of the blank. I call this a finishing fixture, since I also use it when using any "runny" finish, such as polyurethane, on these projects. It is powered by a 6 rpm microwave motor I bought on Ebay for about \$5.00. Basically, just a 1x wood frame to hold everything, the motor and a "mandrel" to hold the project. The photo below shows the important details of its construction. The project is held in the fixture with a 1/4" dowel, which is shimmed with tape to hold the project firmly. A piece of bamboo skewer is inserted in the dowel to extend it to the front of the fixture. If the project uses an 8 mm or larger tube, you can make tapered plugs to hold it, to avoid getting epoxy on your bushings. You can also make mandrels out of all thread and use nuts to hold tension on the project. If you do not want to make one yourself, they are commercially available through stores that sell rod building supplies, such as Mud Hole Rod Building and Tackle Crafting. Also, Penn State Industries has started selling a rotary drier for pens.



### FINISHING FIXTURE

To use the fixture, slide the blank onto the fixture's mandrel. Be sure it is snug and will rotate with the mandrel. Use the mandrel to hold the blank while applying the finish, then insert it in the fixture. After one mandrel slipped off the fixture while spinning, I started using small elastic bands to keep the mandrel coming loose. It is held on with small hooks bent out of wire attached to the motor shaft and the mandrel. Let the fixture run till the finish or epoxy is hard enough to not sag, this can take several hours in cool weather. If using epoxy allow it to cure further, at least overnight, before proceeding. Turning the epoxy in this manner will result in a smooth surface, which can be turned, sanded and polished just as you would do an acrylic blank.

So far I have not tried using a CA finish on these, but I think it would require a lot of coats to fill in the texture of the thread wraps. If the groove is filled with epoxy then leveled to match the wood, CA should work quite well.

If you wish to cast the blank in resin, the wrapping can be done on the bare tube, then cast. The ones I have seen done this way have the entire tube covered with thread. I don't cast blanks, so I haven't done any this way. I may have to do that one of these days. Several coats of color preserver will keep the threads in place while the blank is put in the mold and cast. Otherwise, the process of wrapping is the same as outlined here.

In addition to providing a base for the following wraps, base wraps can be used as a design element, or to make a complete design. This is done by varying the width and color of adjacent bands of wraps. An example is the decoration on the Freedom Pen Project pens shown in the photos above.

I also make blanks on which I duplicate the ribbons that are earned by military personnel. These are wrapped as described above, with the widths and colors of the various bands matching the widths and colors of the ribbons. The photo below shows a bullet key chain with the ribbon for the Viet Nam war wrapped on it with base wraps.



Many other patterns can be made using just the base wraps, varying the widths and colors of the bands. Also, the colors could have significance for the user, such as school colors, team colors or just a person's favorite colors.

In the references below, more advanced techniques are discussed, such as cross wraps and weaving. I will post a description of making cross wraps as Part 2 of this article, as I feel Part 1 is long enough already. Suffice it to say that the techniques, tools and skills found in Part 1 will be used in Part 2.

If you do make a wrapped project, be sure to post it on the forum. If you have any questions, please let me know and I will try to answer them for you.

#### A. References

These books contain more details on thread wrapping and present more advanced tools and wrapping techniques.

Advanced Custom Rod Building by Dale Clemens  
Decorative Wraps by Billy Vivona

#### B. Sources for information on service awards and ribbons

The Institute of Heraldry of the Secretary of the Army

Wikipedia Article:

"Awards and decorations of the United States Armed Forces"

#### C. Sources of materials and tools

Mud Hole Rod Building and Tackle Crafting

Wrapping tools and supplies - they have all the tools and supplies listed in this article.

[www.mudhole.com](http://www.mudhole.com)

Jo Ann Fabrics, Hobby Lobby and other fabric and hobby stores

Threads of all sorts. Embroidery scissors.

Tom Wilson

Jolly Red

