Parts Two and Three: Building the F.I.B.H Ferrule

Article and photos by Bjarne Fries

This article is part two in a series of articles devoted to a bamboo ferule I invented three years ago. *FIBH* stands for: *Fries Integrated Bamboo Hexaferule*.

Let me start by saying that as a European rodmaker I am used to measuring in meters, centimetres and millimetres. When I started rod building I had to cope with feet inches and fractional inches; it was very confusing. Now I am in the happy position to return this confusion to where it came from. For those of you not used to this here is some information:

- 1 inch is 25.4 millimetre (mm).
- 1 centimetre (cm) is 10mm.
- 1 meter (m) is 100cm.
- I use 1/100 of 1mm (0.01mm) as the smallest number for dimensions in my tapers. This is 2.5 times smaller then 1/1000 of an inch. Have fun!

I use strips that are 3" longer than half the rod length. In this example I will built a 9'rod # 8 for sea trout and pike fishing. For this size of rod I want to make a ferule where the male will go into the female 5cm (more about size later on). The lengths of the final rod sections will in this case (I make a 2 piece rod) be the total rod length plus 5cm (the hole of the ferule) divided by 2.

My aim is to make the diameter of the female ferule section 2.6mm larger than the diameter of that part of the butt that will function as the male part of the ferule. This will allow for a wall thickness (more about this later) of the female of up to 1.3mm. Remember this when you split the strips for the tip; they need to be wider than usual. For 2-piece rods I would recommend that you use the same dimensions as for the butt strips, when you try for the first time. This also refers to rough planing dimensions for heat-treating (I feel the joy of all who love straightening nodes).

To do this, I built a swell into the lower tip section the following way. For the swell, I use a specially made planning form (from now on referred to as the "swell form") with a parallel grove with a depth of 1 mm. This form needs only to be 42". This allows for 9 x 5" points and 1" leeway on either end of the form. At the next last 5" point I have a sudden step down of the groove of 1.3mm, which gives depth of the groove of 2.3mm, which continues parallel for the rest of the form. (**See photo1**).

With this I can produce a ferule swell of 1.3mm on a single strip over a length of 3.5 to 4.5cm depending on the thickness of the material going into the final tip section.

This means on a very light rod (#3 weight), I can make the swell as short as 3.5mm and on a heavier rod (#6), the swell will be 4-4.5cm long. In theory, the shortest possible swell would be most desirable, but too short a swell on too heavy strips would make it impossible to get a closed gluing line later on.

The 5" point where the groove drops 1.3mm on my planning form, I call swell point. All in front (higher up the tip section) will be your original taper.

For my 9-foot rod, I need 5 cm for the fit of male and female as well as 2.5cm leeway at the end of this. This is practical for several reasons to become clear later on. Then I need 0.5 cm of the parallel part where the hexagonal hole will be made to be solid before the swell starts. Finally I need 4cm for the swell itself. This altogether calls for 12cm of material from swell point to the end of the rod section.

I put a mark on the swell form 12cm from the swell point and place the parallel, heat-treated strip with its end at this mark. I also mark the different parts of the ferule on the email side of one strip. (**See photo 2**).

Having done this transfer these marks on a clean shed of paper. In case your marks on the strips disappear you always have the source to renew them.

Now is the time to find out where the swell point will be placed in the final rod and what the half diameter of the taper is at that point.

My procedure for this is as follows:

- 9‘rod is 108".
- The fitting part of the ferule is 50mm.
- The length of the 2 sections will be 108" plus 50mm divided with 2.
- This is 54" + 25mm.

Now I place the marked strip in the planing form I use for final planing. The end of the tip section will be placed at 54"+25mm (half of the ferule fitting length) +25mm (leeway). This means 56". Now I mark the planing form for the correct placement of the strips for final planing at this point. (**See photo 3**).

Now I measure the distance from the swell point to the next adjustment screw at 50". This is 1" and 6/32", so the swell point will be placed at 51 6/32".

My taper calls for 3.14mm at 50" and 3.31 at 55" (these are ½ diameter Dimensions).

The increase of dimension from 50" to 55" is 0.17mm. The increase per inch is 0.17mm divided with 5, say 0.035mm. Since the swell is placed at 51 6/32", the half diameter at 51 6/32" will be 3.14mm + 0.035(1 inch increase) + a theoretical plus of 0.007mm(for the 6/32"). In practice I sum 0.035mm + 0.007mm and round up to the next 1/100mm which in this case means 0.05mm. So the 1/2diam. at the swell point will be 3.19mm for final planing.

Now back on the swell form I set the depth at the swell point to 3.69mm (3.19mm + 0.5mm extra for the process of removing the enamel from the strip). Now I mark the placement of the setting screw placed in front of the swell point on the marked strip. This point should lay at 46 6/32" in the final planing form when you place the strip according to the placement mark on it.

I mark this point on the final planing form itself as well and then set the final planing form according to my taper shed from 0" to 50". After that I measure the depth of my final planing form at 46 6/32" and set the setting screw placed 5" in front of the swell point on my swell form to this depth + 0.5mm. This also goes for the remaining setting screw in front of this screw. So from this point and forward we have a parallel groove.

Now I set the last setting screw of the swell form to the depth that allows the deeper groove to run parallel. The reading on your depth gauge should show 4.99mm (3.69mm + 1.3mm) for the length of the deeper groove from swell point to placement mark.

“Grey, dear friend is all theory,” Goethe once said, so now let us move on to some action to clear inches and mm out of our mind for a while.

Now having set the swell form to the correct dimensions + 0.5mm as well as the final planning form to the final setting from 0" to 50" we can start some planing. First I plane the swell into the strips as well as

remove surplus material from the parallel section starting from the setting screw 5" in front of the swell point. To do this I start by placing the plane (Stanley 9 ½) on top of the swell form, that the cutting edge of the plane will be placed about 10mm lower (towards the last setting screw of the form) than the swell point. Then I mark the front of the plane on the form so I will be able to start planing at exactly the same point. (**See photo 4**).

I place the first strip in the form, place my plane using the beginning mark for planing and take a long precise stroke to near the end of the form, stop and draw both strip and the plane, still resting on the strip, both simultaneously back in the form until the rest of the strip is resting in the groove and continue planing the rest of the strip. In this way I obtain a continuously stroke the whole length of the strip even if my form is shorter than the strip.

Important:

Be carefully to alternate strokes on both sides of the strip to obtain a perfect symmetrical swell.


photo 4


photo 5

Don't start planing the ferule part of the strip yet.

After several strokes on both sides of the strip, the blade of the plane will shave less and less at the beginning of the stroke. Don't worry, keep on going until all strips are flush with the surface of the form from the setting screw 5" in front of the swell point and towards the 0" point of your tip strips.

I do so with all 6 strips, and they should look somewhat like in **photo 5**.

Now I mark my swell form with 4 marks, starting 10mm after the mark for my plane and with 5mm distance between them. I place the front of the plane on the first mark and take two strokes on each side of the strip alternating sides every stroke. Then I repeat this starting from the second mark (15mm behind the mark for the plane), the third and the fourth. At first you will only take very short shavings, but soon they become longer. Having done this I take strokes over the whole ferule section and about 10" further up the swell point until all strips are flush with the surface of the form.

Now I set the swell form to the same setting as before minus the 0.5mm and remove the enamel on all 6 strips with my L.N. 212.

Before planing the ferule section and the 5" in front of the swell point to final dimensions, I switch to the final planing form again and plane all strips to oversized final taper by placing them 5" back of the placement mark at 56". When they are almost flush with the surface of the form, I switch back to the swell form again. Before I can plane the ferule section to final dimensions I need to change the setting of the last setting screw on this form.

The reason for this is that the male part of the ferule has a taper, and to have a tight fit all along the fit of the ferule we need to make a conical hexagonal hole. I check the taper of that 5" segment where the male is placed in the finished rod, in my case the fitting part of the male is placed from 53" to 55" so I need the taper from 50" to 55". Here I have an increase of 0.17mm (half diameter.), so I set the last setting screw of the swell form to be 0,17mm deeper than the depth of the deeper groove just under the swell point. In my

case the groove there should show 4.49mm and I set the last screw to 4.66mm. Now I make the final planing of the ferule part.

Before I finish my planing in the final planing form I set the 55" point to be 0,5mm deeper than the depth of the 50" point. Now the thicker part of the ferule section will not show too high over the surface of the form, but still enough for convenient fixing the strip with the free hand while planing. The swell point of the strips should now flush with the surface of the form. Now I check at which point the strip rises over the surface of the form and put a mark on the form at that point. Now I check if the distance from this mark to the swell point of the strip is longer than the distance from the cutting edge of my plane to the heel of the plane. If it is, I simply can place my plane with the heel at the swell point and start planing from there to the 0" point of the strip.

But often the distance will be too short to do this and you will have to slant the plane so no part of the sole of the plane will come in contact with the ferule section rising over the surface of the form, since this would prevent the cutting edge of the plane to be in contact with the strip. I prefer to do this by thinking of the strip as a road I want to follow in my car (plane). I always approach the strip from the apex side and make a slow right turn as soon as the cutting edge comes in contact with the strip to drive along the highway. Being right handed, the left turn feels a little awkward at first, but take it nice and easy and don't speed up too soon!!

Note!! It is no good idea to set the groove, where the ferule is placed, deeper, to let the ferule section flush with the surface of the form. If you would increase the depth of the form more than 0.5mm at 55" than at 50", this would smaller the groove between 45" and 50" although both points have the correct depth, and you would end up with a tip having a weakness in this area!

Now I finish planing all strip to final dimension, take one stroke over the apex of each strip, and planing is finished!

Almost… depending of which wall thickness you want on your female ferule.

For all 2-piece rods up to #5 I use a wall thickness of 1,2mm as well as the upper ferule on 3-piece rods. For heavier rods for #6-8 as well as the lower ferule on 3-piece rods I choose 1.3mm.

So in my case I settle for 1.3mm for my "heavy duty nine footer "and am finished with planning.

If you want a wall thickness that is less than 1.3 do like this:

Use a 5" section of you final planning form and set it to the same taper as the 5" section in which the male part is located + the wall thickness you want (half diameter.). Turn the form so you plane from thin end to thick end (the

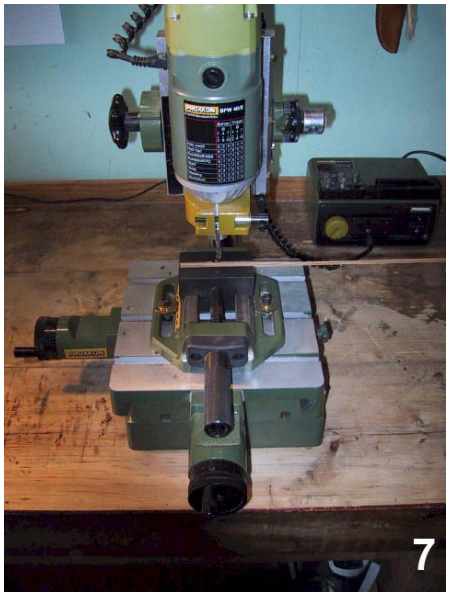
contrary of the usual way you do). Mark the correct placement of the strips end where the ferule section is on the form. Take on a latex glover (I use thin ones, like nurses use) on the none planing hand to prevent the strip from slipping out of your fingers and cut you, as well as to protect the gluing surface of your strips if you have sweaty hands. Now hold the thinner part of the strip about 60 cm from the ferule part and rest your hand on the surface of the form so the end of the ferule is placed at your placement mark and plane the ferule part flush with the surface of your form. (**Photo 6**).

It is important to set your plane to take very thin shavings and change sides with every of the few strokes that are needed.

Now we talk about wall thickness of the ferule a few words on the length of the male or the fit of the ferule as well.

For very light 2-piece rods as well as for the upper ferule on 3-piece rods I use 35mm for the fit. On medium rods I use 40-45mm, and on heavy rods and the lower ferule on 3-piece rods 50mm.

Now we are finished and ready for the next step: the making of the hexagonal hole.



Part 3.

Making of the hexagonal hole of the female ferrule and gluing

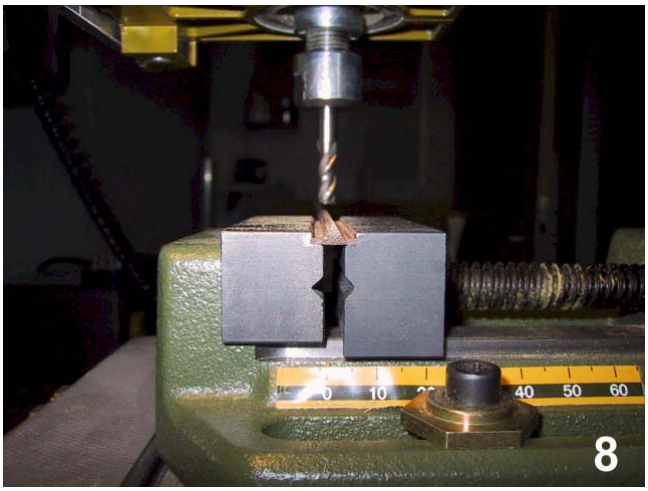
To make the hole of the female, simply take away material from the inner apex of the strip, until you end up with the wall thickness of your choice.

In my case I want 1.3mm.

Although you have a uniform wall thickness of the ferule you will, because of the slight taper of the strips in the fitting part of the ferule, end up with a conical, hexagonal hole after gluing.

To remove the inner apex I use a milling machine. (**Photo 7**).

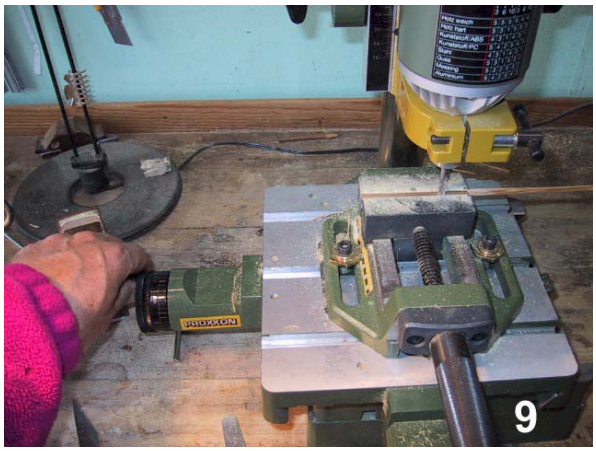
To hold the strips apex up, I simply glued 2 small strips of bamboo, 1mm thick and with a 60 degree angle on one side, on to my machine vice which is fixed to the moveable board of my milling machine. The small grooves created by my bamboo strips and the surface of the machine vice hold the corners of my strip to be milled. (**Photo 8**).



Now I only have to put my strip in my changed machine vice and close it firm but not hard and then let the strip pass under the milling head by moving the board.

I start milling the 75mm part to form the final hole from the swell towards the end of the strips by lowering the milling head 1.5mm from the first contact with the material to be removed. Then I move the

strip to the right, until I reach the end of the strip and then back again. I do this with all 6 strips. Then I repeat the procedure but lower the milling head an extra 0.5mm. This is done, until I reach to within 0.2mm of the final diameter with all strips. Now I start milling from the end of the strip. Using the first 25mm of leeway of the 75mm I lower the milling head little by little, check with my dial caliber, lower the milling head again, check the wall thickness and so, until I reach the correct setting. Now I mill all strips from the end towards the swell and back again, change strip and repeat this with all strips without to have to change the depth of the milling head. Doing this step by step, I avoid too much splitting of fibers during milling, which will occur when taking too much material in one pass under the milling head. (**Photo 9**).



I am no machinist so I guess there are easier ways to get to the wanted wall thickness, but I reach exact dimensions of the wall by 0.01mm, and that is more then enough for this purpose.

Before I prepare the strips for gluing, I sand the two gluing flats of each strip in the area where swell meets hole very carefully with fine sandpaper to remove overhang created by the milling process. I want a clean, flat gluing surface. (**Photo 10**).

Now all strips are finished, ready for gluing, and should look something like this. (**Photo 11**).

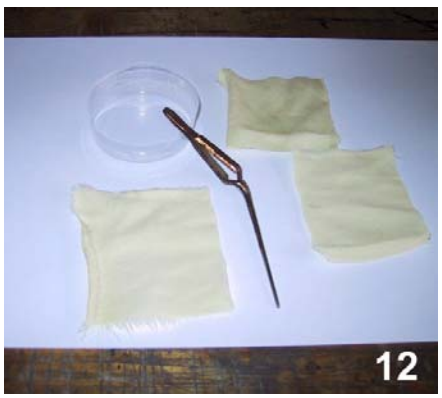
Gluing.

When gluing the FIBH-ferule there are 2 critical stages. Closing the gluing line at the swell area and cleaning the hole of the female from excessive glue.

Since you fight against the clock (hardening of the glue) you have to prepare everything in advance, there will be very little time for faults or waste of time.

For cleaning of the female hole I cut a few pieces of old cotton clothing to a size of about 3"x 3". I use a pair of tweezers with thin, long (3") points. They are the kind that opens when you squeeze them and close when being released. **(Photo 12**.)

With the tweezers I grip a piece of the clothing in the middle and then turn the clothing around the points of the tweezers. Whatever you use, check it will go inside the ferule hole before you glue, and most important, that it will come out again when the hole is filled with sticky glue!



Don't use cotton

sticks (the one used for cleaning ears and the like)! I can tell you from experience that it is not funny to try to get hold of a small cotton bullet inside a bamboo ferule while the clock is ticking!

I also prepare an extra spool of binding tread on the ground. This I use for the initial hand wrapping, keeping the tension tight by pressing my feet against the spool.

For gluing I use the resorcinol glue giving a red colored gluing line. I have used this glue for the past 25 years, and besides being the best glue I have tested, it is a very honest glue, not hiding any faults on the side of the maker!

As soon as I have put on the glue on my strips, I scrape of the excess glue from the inside of the flats that will form the hexagonal hole, and start a tight freehand pressure wrap. I start about 2" in front of the swell point and work down to the end of the ferule, fix the thread and cut it. Be sure to make the windings close and with sufficient pressure to close the gluing line around the swell area.

This really is hard work, and you do not have much time or the glue on the thin tip strips will get very nasty.

At once I put the strips in my gluing machine and proceed as if it was a normal tip.

As soon as I finish this, I take my tweezers with the cotton clothing, soak it sparsely in alcohol and clean the inside of the female, repeating the process with clean clothing until no glue is showing on my cotton.

The finished glued up ferule section and the cleaning tool after use. (**Photo 13**).

Preparing the ferule for fitting

Take the cured, glued tip section and remove the binding thread except on the last 10mm of the ferule section, remove the glue, and straighten the tip section for twists and bends in front of the swell if necessary. Finish the tip section the same way as usual, so it is ready for mounting the guides and being varnished.

DO NOT attempt to try the fit of the ferule yet! I know you can barely wait. But DO NOT do this until all the preparations have been made.

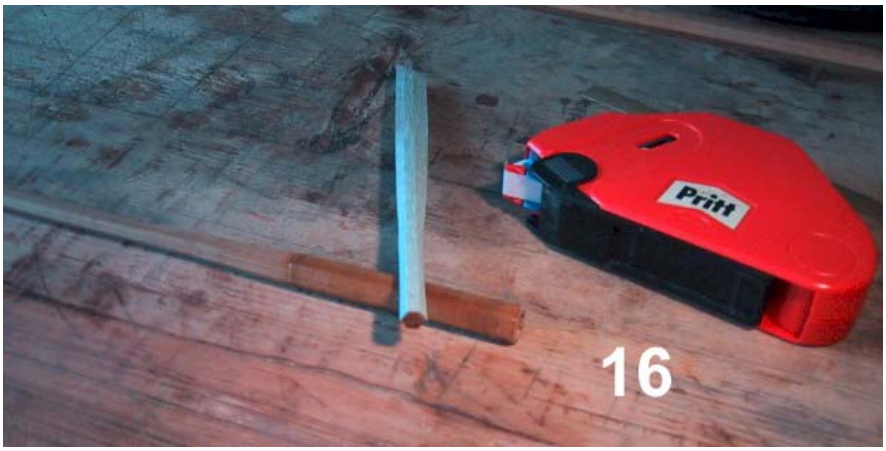
Now mark the ferule section for the placement of the essential support wrapping. (**Photo 14**).

It should go from the end of the ferule and proceed the ferule hole by 10-15mm towards the swell. In my case I put the marks at 22mm and 90mm from the end of the ferule and lay the windings between these marks, starting 4mm after the first mark and ending 4mm before the 90mm mark.

On light to medium rods I make the winding 1 layer of 168-denier natural silk, starting from the end and moving towards the swell. I move in this direction, because it is easier to make a tight wrap in the beginning than at the end (for me at least). In my case with the strong 9‘ #8 rod I choose a double wrap for the last 10mm of the end of the ferule and in this case I start at the swell area.

It is important to lay the winding as tight as possible especially at the end of the ferule. Now our 25mm of leeway shows it’s usefulness, while laying the winding.

Finishing the winding, I seal the ferule hole with masking tape and am now ready to dip varnish the windings. (**Photo 15**).Give the windings 3 layers of varnish with sufficient drying



time in between.

Fitting of the FIBH-ferule.

The varnished support winding being dry, we are now ready for fitting the ferule.

Start by cutting the leeway on both the female and male part of the ferule of with a fine saw. I use a Japanese saw with a very thin and fine-toothed blade.

Before attempting to put the male in the female, mark the length of the male (this starts to sound like some sexual manual of a kind) to go into the female and round the corners of this length with sandpaper. It is important to do this first, since there will be a small built up of glue left in the corners of the female hole, even if we were very carefully to clean the inside hole after gluing. A true tight fit of the ferule, and with this the maximum ability to transfer energy from but to tip, should come from the contact of all six sides of the male to all six inner sides of the female hole, not the corners only!

The next step is to sand the inside hole of the female lightly. For this I take a piece of an old blank with a diameter 0.5-1mm smaller than the hole of the ferule and about 50mm longer. From this, I make a hexagonal sanding block by cutting a strip of fine sandpaper that will cover 3 sides and 2 corners of the help tool, cover the backside of the sandpaper with a thin film of glue and fix the strip to the 3 flats of the piece of blank. (**Photo 16**).

Now I take 2-3 strokes on each inside flat of the ferule hole. Be sure to have good contact to the hole flat while doing this and clean the inside for dust when you finished sanding.

Now it is time to try the fit of the ferule for the first time!

If the fit of the ferule is loose don't worry, we will fix that. If the fit is too tight to put the whole length of the male into the female part, you have to sand a little of all 6 sides of the male. Check the diameter of the male at the thinnest part of the fitting part on all 3 pairs of flats with a digital caliper, as well as the taper of the fitting part. Sand the flats until all 3 flat measurements are equal and the male will go into the female easy, but not loose.

Now all parts of the bamboo ferule must be sealed for protection against moisture.

I have tried many different methods to do so and have finally settled with this one: I use a polyurethane glue (one that foams up while setting) that I also use for gluing my cork discs for the grip. I found out that this glue, when thinned with acetone, (not shaken but stirred) would give a very hard, thin layer that will resist moisture as well as the wear of assembling and disassembling the rod parts. The trick is to thin the glue well (I estimate about 40% glue to 60% acetone) and put it on with a thin layer. If you put on too much, you will get the foam coming. In this case either wipe of with acetone, or if it has hardened too much, wait till completely dry and sand of.

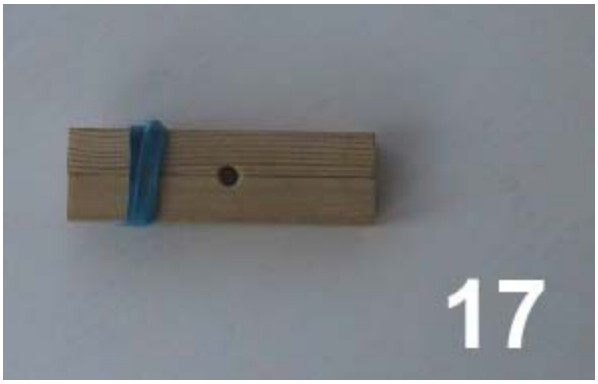
I start to put a thin layer on the inside of the female, wait for 30 seconds to a minute to let the solution penetrate and then wipe it over with my cleaning tweezers and a piece of cotton clothing (you don't want foam inside your female!!) just in the same manner as when cleaning after gluing, but without alcohol on the rag.

Then I mark the underside (the side where you are going to put the snake guides) of the male part where the female should end, when the rod sections are assembled, with a small black mark. This will remain there so you always can check if the ferule is correctly assembled. Now I cover the fitting part of the male plus an extra 10mm, in my case 60mm in all, with the same solution in a thin layer and let it all dry for about 6 hours. Now I check the fit again. If the fit is still too loose, put on one more thin layer on the male and try the fit again when dry. Don't forget to seal both ends of tip and but section as well!

If the fit is too tight sand of a little of the sealing layer, always checking with your caliper. When the fit feels OK, sand the area of the transition from glue to cane to be smooth. Later, when dip varnishing the but section, I will put on a wrapping of masking tape on the fitting part of the male from the ferule mark to the end of the male ferule, dip varnish the but, and remove the tape after the varnish dried up. Then I form a smooth transition from varnish to the protection layer of the male part at the ferule mark with a razor sharp knife.

Of course you can also experiment with the sealing method Bob Nunley wrote about in his article on his bamboo ferule in a former issue of this magazine. Or you find (and hopefully share with the rest of us) a totally new Method.

Now I rub the whole male with a dry piece of hand soap, put male and female together and repeat this, until the ferule works smoothly both ways. Later, when the rod is in use, I repeat this step from time to time, when the ferule starts to stick.



When, during fitting, the male and female get stuck together, you will need a small help tool to take the rod sections apart easy and safe.

Take 2 pieces of wood about 15mm x 15mm x 100mm. Put the two pieces of wood on top of each other and make a hole of a size a little bigger than the male, but smaller than the female, and place the center of the hole where the two pieces of wood meet. Put a rubber band on one end oft the 2 pieces of wood. (**Photo 17**).

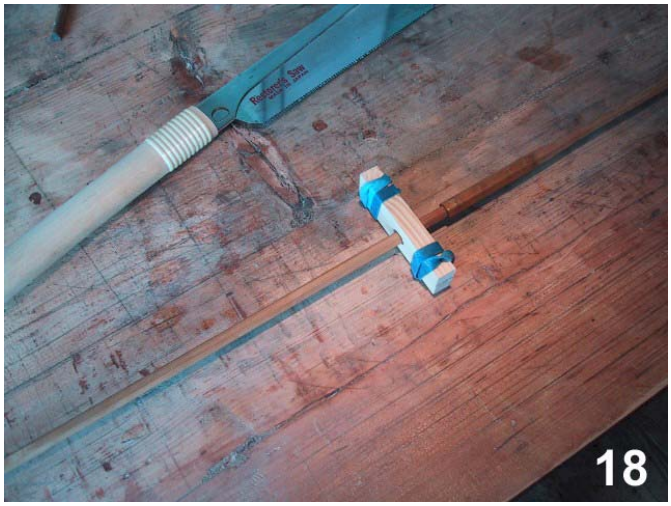
When the male and female part of the ferule sticks together, I put the help tool over the butt section just beneath the female and put on another rubber band on the other side of the help tool. (**Photo 18**).

Now sit on the ground, feet in front of you, and hold the rod between your legs, so the help tool will rest against the sole of your feet. Now hold the butt section tight with both hands and pull towards yourself. The rod will come apart easily. (**Photo 19**).

Save this tool for your fishing vest!

Now the FIBH-ferrule blank is finished!!! (**Photo 20**).

The rest, grip, guides and varnishing is as usual. Before dip varnishing the tip section I cut a hexagonal piece of cork and seal the female hole with it.



EPILOGUE

I know this all is a lot of extra work, but believe me; the result is worth the trouble.

I would suggest, that those of you, who want

to give it a try, choose your favorite rod model and built this with my FIBH-ferrule. Than compare the two rods, feel the difference of transfer of energy, the improved sensitiveness and judge for your self.

By the way for those of you loving the Quad, I can't see any reason why it should not be possible to build a FIBQ-ferrule!

Bjarne Fries is a world reknown Danish maker of split cane flyrods. The innovation and scholarship shown in this series has really left me speechless. You can find out more about Bjarne at his website found at **http://www.fries-rods.dk/index.html** -Bob Maulucci