Three-Strand Furled Leaders, Tenkara Lines and Fly Lines

Three-strand furled leaders, tenkara lines, and fly lines provide a smoother taper as compared to their two-strand counterparts. Additionally, a three-strand furl has a rounder cross section and is denser than a two-strand leader. these properties produce a leader or line that is thinner in cross section and penetrates the wind better. But the best property of a three-strand furl is the reduced “spring back” inherent in a two-strand furl. If you’ve ever snagged a two-strand furled leader and had it spring back into a knotted mess, you know what I’m talking about!

Making a three-strand furled leader or line (tenkara or fly line) is only slightly more complicated than making a two-strand furl. The odd number of strands requires extra knots in order to complete the thread wraps for the strand. While it is possible to lay-out the three-strand leader like a typical two-strand leader with a continuous thread for two of the strands and then add on the third strand, I prefer to lay-out each strand independently. The extra knots do not affect the performance or appearance of the finished leader or line. I feel that laying-out the strands individually gives me more control over tension, but try it both ways and determine what works best for you.

Tools

The basic tools required to construct a three-strand leader are similar to those required for a two-strand leader and include:

- a furling board
- a “furling machine” of some sort

A simple 8’ furling board can be constructed from a 1x8 pine board. The board has three rows with three pegs in each row, laid out according to the leader or line formula (see below). The pegs are 1/2” D wooden dowels 2 1/2” long fitted into 1/2” holes drilled in the board. Strand twisting is done at the butt end of the leader or line. A furling machine[1] can be mounted at one end of the board using an “L” shaped bracket made of pine (see **Figure 1**) or you can use an electric drill to twist each strand one at a time.

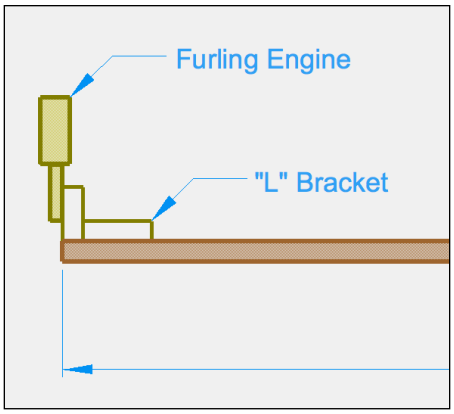

Figure 1: Furling Machine Mounting

[1] We manufacture Furling Machines for sale: http://www.eclecticangler.com/production-furling-machine/.

The other end of the board has a peg for each of the three strands - this is the tip end of the leader or line. A small pulley (about 1 1/2" diameter) is mounted behind the middle peg. I use a plastic wheel used for a sliding screen door as a pulley; these can be found as replacement parts at most hardware stores and home centers. The pulley is mounted so its top is higher than the pegs and it slightly overhangs the end of the furling board. This allows a line (about 3' long) with a weight tied to its end to be used to provide furling tension (*tension line*). The other end of the *tension line* is tied to a hook ("S" hook) (see **Figure 2**).

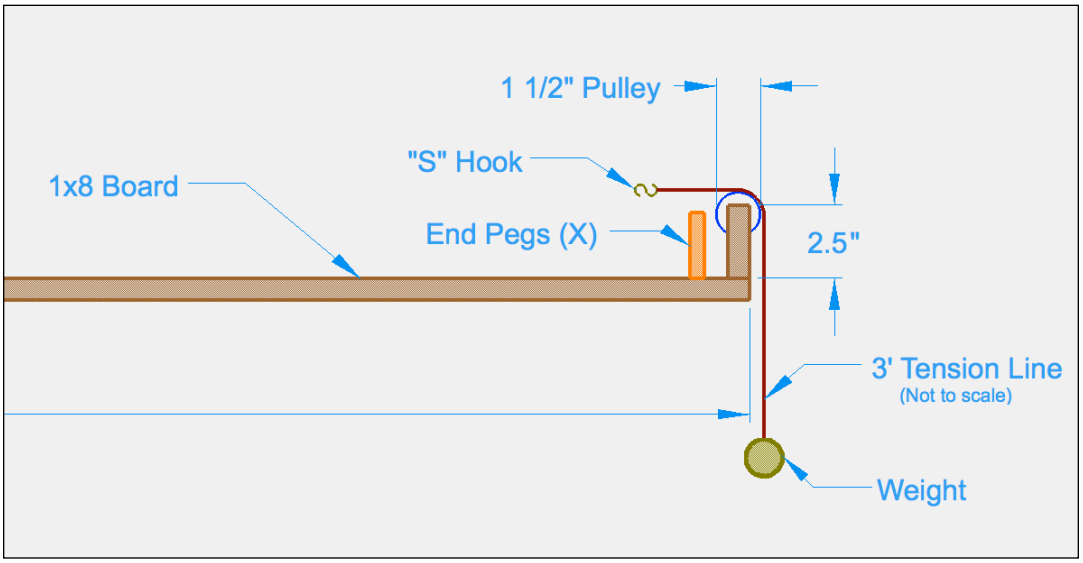

Figure 2: Furling Board "Tip" End

The tip ends of the three strands are placed on this hook after the strands are laid out and ready to twist. The weight at the other end can be adjusted to provide the proper tension for the specific leader or line you are making. The goal is to provide enough tension so the strands do not twist upon themselves and knot up but not so much as to break or overly strain the strands.

I also have an 8' extension board that can be used to create a 16' furling board. The extension mounts to the butt end of the primary furling board. I use a short length of 1x8 screwed to the extension and furling board to keep them aligned. The furling machine is attached to the extension board. I have attachment points at 1' increments. The basic idea is, this extension board is used to furl an untapered butt section from 1 to 8' long for longer leaders or tenkara lines. The leader and line formulae below have provisions for adding this butt section. If I am furling a 45' or 90' fly line, I simply position this extension board 30' or 65' from the primary board. This becomes my "rope walk"[2].

Figure 3 shows side and top views of the furling board setup to create an even taper furled leader. The red pegs correspond to Strand 1 in **Table 3**, the purple pegs to Strand 2, and the orange pegs to Strand 3.

[2] See: http://en.wikipedia.org/wiki/Ropewalk

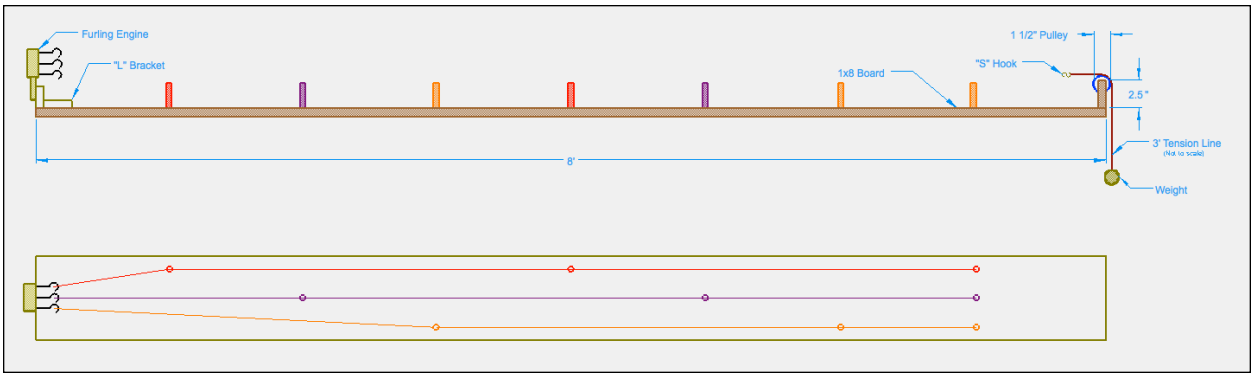

Figure 3: Furling Board with Even Taper Layout

Materials

Three-strand leaders can be constructed from the same materials as two-strand leaders: fly tying thread, mono or fluoro fishing lines, nylon thread, or silk thread. I recommend starting with standard 6/0 UNI-Thread fly tying thread. It is inexpensive and makes a great leader or line. The color choice is up to you. I like to use Light Cahill (a very pale yellow) for leaders and tenkara lines.

Layout

Once you have your furling board (and optional extension) set up. It is time to mount the pegs to create the furl taper you desire. I've included formulae for three layouts:

1. A progressive taper that has a gradual taper for 50% of the taper length and then a rapid taper to the tip. This is my standard, everyday taper.
2. A weight-forward taper that has a gradual taper for about 2/3 of its length and then a very rapid taper to the tip. I've found this taper to be excellent for wind penetration and tossing tiny flies.
3. An even taper that simply decreases evenly over its length.

Progressive Taper Layout

The progressive taper is shown in **Table 1**. Position the pegs for each strand according to the chart:

***Strand 1*: Peg 1** at 1' from furling hook, **Peg 2** at 3' from hook.

***Strand 2*: Peg 1** at 2' from furling hook, **Peg 2** at 3 1/2' from hook.

***Strand 3*: Peg 1** at 2 1/2' from furling hook, **Peg 2** at 4' from hook.

The End Peg (**X**) is located at 5' for each strand.

Progressive Taper for 5' to 12' Leader or Line																						
		Pegs																				
		1 to 8'	1'			2'			2 1/2'			3'			3 1/2'			4'			5'	
Strand 1		Level Length	1									2									X	
loops:	&	4 1/2			2 1/2			2 1/2			2 1/2	&	1			1			1			
Strand 2		Level Length + 1'				1									2						X	
loops:	&	4 1/2			4 1/2			2 1/2			2 1/2		2 1/2	&	1			1				
Strand 3		Level Length + 2'							1									2			X	
loops:	&	4 1/2			4 1/2			4 1/2			2 1/2		2 1/2		2 1/2	&	1					
Total Threads:		27			23			19			15		12		9			6				

Table 1: Progressive Taper

Lay out each strand individually. Here is how I do it. Start with Strand 1. Make a 2" loop in the end of your thread (*e.g.* 6/0 UNI Thread). Place this loop over the hook on the furling engined. The "**&**" character in the left column in **Table 1** represents this knot. Loop the thread around **Peg 1** and back to the furling engine hook four times. Then loop and continue the thread past **Peg 1** to **Peg 2**. Loop around **Peg 2** back to **Peg 1**. This time, pass the thread between the thread loops at **Peg 1**. This is what interlocks the loops together to make the leader or line. Continue to make two complete loops. Complete by looping back towards **Peg 2** and continuing to the end Peg (**X**). Loop the thread back to **Peg 2** and pass it through the thread loops at **Peg 2**. Cut the thread about 6" past **Peg 2** and tie off the end as indicated by the "**&**" under **Peg 2**.

Follow this same procedure to create Strands 2 and 3.

Weight-Forward Taper Layout

The weight-forward taper is shown in **Table 2**. The pegs are positioned according to the chart:

***Strand 1*: Peg 1** at 1' from furling hook, **Peg 2** at 4' from hook.

***Strand 2*: Peg 1** at 2' from furling hook, **Peg 2** at 4 1/2' from hook.

***Strand 3*: Peg 1** at 3' from furling hook, **Peg 2** at 5' from hook.

The End Peg (**X**) is located at 6' for each strand.

Weight-Forward Taper for 6' to 12' Leader or Line																						
		Pegs																				
		1 to 7'	1'			2'			3'			4'			4 1/2'			5'			6'	
Strand 1		Level Length	1									2									X	
loops:	&	4 1/2			2 1/2			2 1/2			2 1/2	&	1			1			1			
Strand 2		Level Length + 1'				1									2						X	
loops:	&	4 1/2			4 1/2			2 1/2			2 1/2		2 1/2	&	1			1				
Strand 3		Level Length + 2'							1									2			X	
loops:	&	4 1/2			4 1/2			4 1/2			2 1/2		2 1/2		2 1/2	&	1					
Total Threads:		27			23			19			15		12		9			6				

Table 2: Weight-forward Taper

Lay out each strand as described above in the **Progressive Layout Taper** section.

Even Taper Layout

The even taper is shown in **Table 3**. The pegs are positioned according to the chart:

***Strand 1*: Peg 1** at 1' from furling hook, **Peg 2** at 4' from hook.

***Strand 2*: Peg 1** at 2' from furling hook, **Peg 2** at 5' from hook.

***Strand 3*: Peg 1** at 3' from furling hook, **Peg 2** at 6' from hook.

The End Peg (**X**) is located at 6' for each strand.

		Even Taper for 7' to 12' Leader or Line												
			Pegs											
		1 to 6'	1'		2'		3'		4'		5'		6'	7'
Strand 1		Level Length	1						2					X
loops:	&	4 1/2	2 1/2		2 1/2		2 1/2	&	1		1		1	
Strand 2		Level Length + 1'			1						2			X
loops:	&	4 1/2	4 1/2		2 1/2		2 1/2		2 1/2	&	1		1	
Strand 3		Level Length + 2'					1						2	X
loops:	&	4 1/2	4 1/2		4 1/2		2 1/2		2 1/2		2 1/2	&	1	
Total Threads:		27	23		19		15		12		9		6	

Table 3: Even Taper

Lay out each strand as described above in the Progressive Layout Taper section.

Twisting the Strands

Now that the strands are laid out, the leader or line is ready to furl. Starting at the End Peg of Strand 1, remove the loop of thread from the peg and hook it around the hook attached to the extension line looped over the pulley. Now, repeat this for Strands 2 and 3. Once all three strands tip ends are looped over the hook, you can remove the loops of thread from **Peg 2** for all three strands, and then finally remove the loops from **Peg 1** for all three strands.

At this point, the strands are attached to the hooks at the furling engine end of the furling board and are not looped around any pegs. The tip ends are all looped over the hook attached to the extension line that passes over the end pulley and has a weight attached to its other end. As the strands are twisted, they will shorten. The weight keeps tension on the strands. You want to twist the strands until they are about 90% of their starting length. Measure the length of one of the strands from hook-to-hook. Multiply this length by .9 (90%) to calculate the length of the twisted strands. Make a mark on your furling board measuring from the furling machine (the mark will be near the tip end of the leader or line).

Now, turn on the furling machine (or hand crank). Either direction is fine. Continue cranking as the strands twist and begin to shorten. As they shorten, the extension line

and its weight will keep tension on them. When the extension line's hook reaches the 90% mark you made, twisting is complete.

Furling the Leader or Line

Furling is accomplished by letting the energy stored up in the twisted strands to twist the three strands together. This will always happen in the opposite direction of the strand's rotation. So, if you twisted your strands clockwise, the furl will be in the counter-clockwise direction.

For short leaders, I like to hang them vertically in a doorway. The butt end is up (attached to a small hook in my workshop's door frame). The tip end has a weight to prevent the leader from kinking on itself. Allow the leader to furl until it quits spinning (usually a few minutes).

Leaders and lines that are too long to hang vertically can be furled horizontally. For this, attach a swivel at the tip end of the strands between the leader and the extension line. Keep the weight on the other end of the line to provide tension. Allow the line to furl until it quits spinning. You can also "power furl" by attaching the butt end loops over one of the hooks on your furling machine. Make sure to rotate the machine in the opposite direction of the initial twist. Do not overdo furling, simply let the leader or line relax.

Conclusion

Finishing the leader or line is a matter of personal preference. Some anglers prefer a small metal ring at the tip end. I find these unnecessary and add complexity to the layout. A very good, ultralight loop can be made simply by forming a tiny loop at the tip around an 8 penny nail, then coat the loop with a dab of Super Glue. A Shorb Loop[3] is perfect for this. The Super Glue reinforces the loop to prevent it from closing, allowing you to easily tie on tippet material.

There are several methods of forming a loop at the butt end. The Shorb Loop described above is suitable as is the perfection loop[4].

Add a loop of linen or other line to the butt loop on a tenkara line. This is used to form the overhand knot on the tenkara rod's lilian.

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[3] See: http://www.furledleaders.co.uk/pdf/how-to-shorb-loop.pdf

[4] See: http://www.animatedknots.com/perfection/