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Bruce's 'SN-5' Project
Development of a New Fighter Kite Bridle

This article is simply to share information about a project I've been working on, off and on, for a few years without what I would call any 'success'. The project is to develop a new fighter kite bridle that will allow the kite to have faster forward speeds. Currently I call it the 'SN-5' bridle project.

HOW AND WHY

It came about from my observing how increased wind pressure on the sail or skin of a fighter kite changes the shape of the spine. What I did was simple enough; indoors I held a fighter kite by its bridle with one hand and simulated the effect of wind pressure on the skin by pressing on the skin with my other hand. While I was pressing on the skin, I looked closely at the spine's shape to see if I could notice any shape change during the time I was pressing on the skin. One thing I noticed was the stronger my simulated wind pressure was on the skin, the more the nose portion of the spine bent backwards. I define the 'nose portion' of the spine as the part of the spine from the tip of the nose to the bow/spine crossing point.

When I first noticed this a few years ago, I realized this was something that slowed the kite's forward speed and it occurred at a time when you want the most speed; during strong line pulling. When the nose portion of the kite bends backwards, away from the flyer, it presents increased wind resistance compared to a kite where the nose did not bend backwards under the same wind pressure. The kite with a straight nose would 'cut' through the wind more effectively; well, this is my theory and what I based my experimentation on.

When you are pulling in line like 'mad', you are trying to get the kite to go as fast as possible. During that strong pulling, if the spine and nose area between the tip of the nose and the crossing point of the spine and bow remained straight and did NOT bend backwards, the kite's forward speed would be faster.

AN OBVIOUS SOLUTION

The easiest and quickest solution is to use a very stiff spine at the nose of the kite. I've tested this and it is true that the stiffer spine does not bend backwards as much as a more flexible spine. The trouble with that solution is I prefer spines that are more flexible toward the nose, especially in light to medium wind kites. I know I may be in the minority in that preference, but I believe a flexible nose portion of the spine provides other benefits in the way the kite responds that outweigh the backward bending. Ideally, I want both a flexible spine and minimal or no backward bending during strong line pulling.

MY SOLUTION

A different solution is to make a bridle that will stop the bending of the spine. That was what I decided to do and is the basis of my project. So I began testing various bridle configurations to see if I could create a bridle that when the wind pressure on the kite's skin was strong, such as when pulling in line very fast, the portion of the spine from the bow/spine crossing point to the tip of the nose would remain fixed and not bend backwards. Or, if it did bend backwards, it would do it significantly less. However, I didn't want that feature to create offsetting 'bad' flight characteristics in the kite.

It seemed to me that a light to medium wind kite would be a good test for this bridle theory. This is because flying in light to medium winds is when a predictable 'burst' of speed would be a great benefit in line touch competition flying. So, light to medium wind kites is where most of my experimenting has focused. I define 'light to medium wind kites' as kites that fly best in winds from 1-7mph.

After many different approaches over the past several years, I happened on one that seemed to have the potential to do the job. As I made each version of the bridle I'd test fly the kite to see if I'd notice differences in the kite's flight.

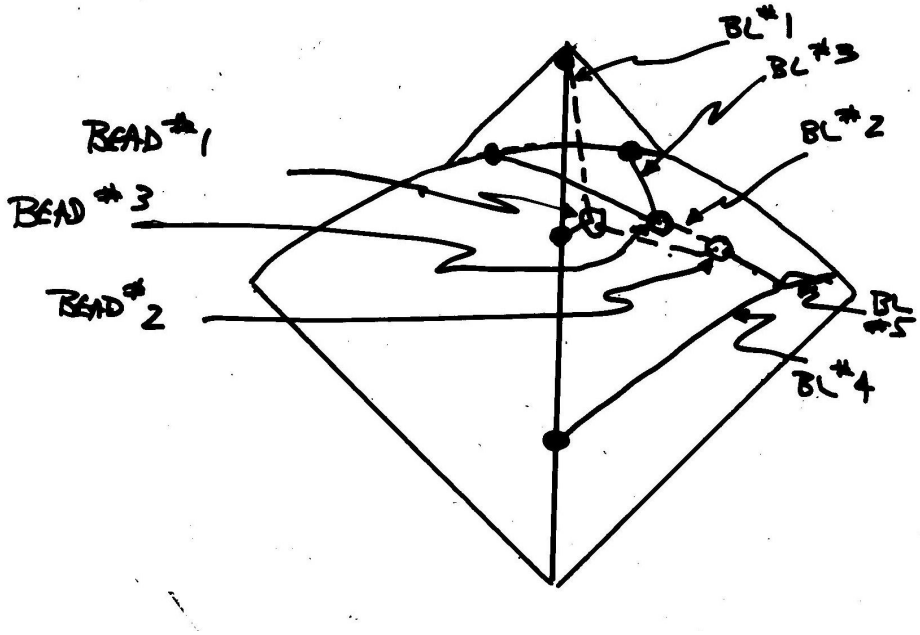
SUCCESS?

Recently I created a version that really seems to work! I could actually notice an increase in the kite's forward speed when pulling in line quickly and when doing all other line manipulations in various wind conditions, the kite performed as it did with a standard 3-point bridle. This was the exact result I wanted! I call it my Straight Nose 5-Point bridle or SN-5. However, the winds where I live are not smooth and don't really give good indications of fighter kite performance compared with smooth ocean winds. I will test it further at the ocean to really know if the SN-5 works.

HERE'S A BASIC DESCRIPTION OF THE SN-5

The bridle uses 5 separate pieces of bridle line and 3 small glass beads. One bead is secured to the upper bridle yoke that has each end tied to the bow. The other 2 beads each slide on one of the other lines making up the bridle. The sliding beads automatically find their correct position based on bridle angle and wind pressure on the skin of the kite. Well, that's my theory anyway.

HERE ARE THE DETAILS OF HOW TO MAKE THE SN-5 BRIDLE



The diagram at the left shows the 5 different bridle segments or lines and the 3 beads.

A description of each of the bridle lines (BL) and beads follows:

As you can see, I'm no artist. Plus, I had some difficulty trying to figure out how to best show this configuration and hope these diagrams and photos will do the job! No matter how complicated it may look in the diagrams or photos, it is quite simple to make.

So far there is no exact length for each piece of bridle line, adjust them to suit. Following are the descriptions I use for the various lines or segments of this bridle.

Bridle Line #1 (BL#1) – This bridle line I also call the 'Nose Yoke'. It is a line with one end tied to the spine at the very tip of the nose and the other end tied to the spine about 4"-5" below the point on the spine where the bow crosses it. 'Below' means toward the tail of the spine. There is a glass bead sliding on it, so don't tie both ends until you've slipped on a glass bead.
The length of this bridle line needs to be such that when it is pulled taught with the bead; it remains below and between the legs of bridle line #3, the 'bow yoke'.

Bridle Line #2 (BL#2) – This bridle line tied on one end to bead #3, the bead on the bow yoke, and the other end is tied to bead #1, the bead that slides on bridle line #1.. Before tying both ends of BL#2, put a glass bead on the line so it can slide along BL#2.

Bridle Line #3 (BL#3) – This bridle line I also call the 'Bow Yoke'. This is the usual upper bridle in a standard 3-point bridle. One end of BL #3 is tied to the bow 1.5" from the spine on one side of the kite and the other end is tied to the bow 1.5" from the spine on the opposite side of the kite. The actual distance from the spine isn't very critical; what is critical is that the distances are equal on both sides of the kite. A glass bead, Bead #3, is secured to BL#3 at the center of the line. I use a larkshead knot with a twist to secure it.

Bridle Line #4 (BL#4) – This bridle line is what I call the lower bridle line in a standard 3-point bridle. One end is tied to the lower bridle connection point on the spine, usually around 6" or so from the tail of the spine. The other end of BL#4 is tied to Bead #2. Bead #2 is the bead that slides along BL#2.

Bridle Line #5 (BL#5) – This is the tow connection loop and is attached with a larkshead knot to the lower bridle line (BL#4).

Each of the 3 beads is described as follows:

Bead #1 – this bead slides along BL #1 and one end of BL #2 is tied to it using a knot tied through its center hole.

Bead #2 – this bead slides along BL #2 and one end of BL #4 is tied to it using a knot tied through its center hole.
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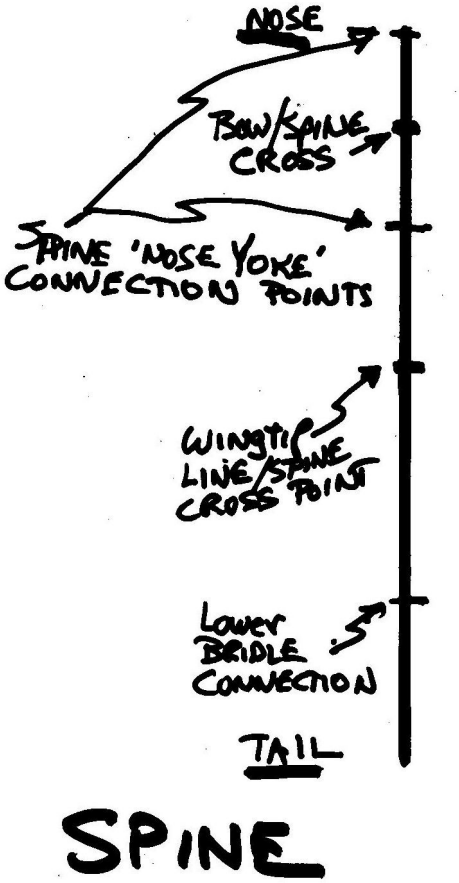
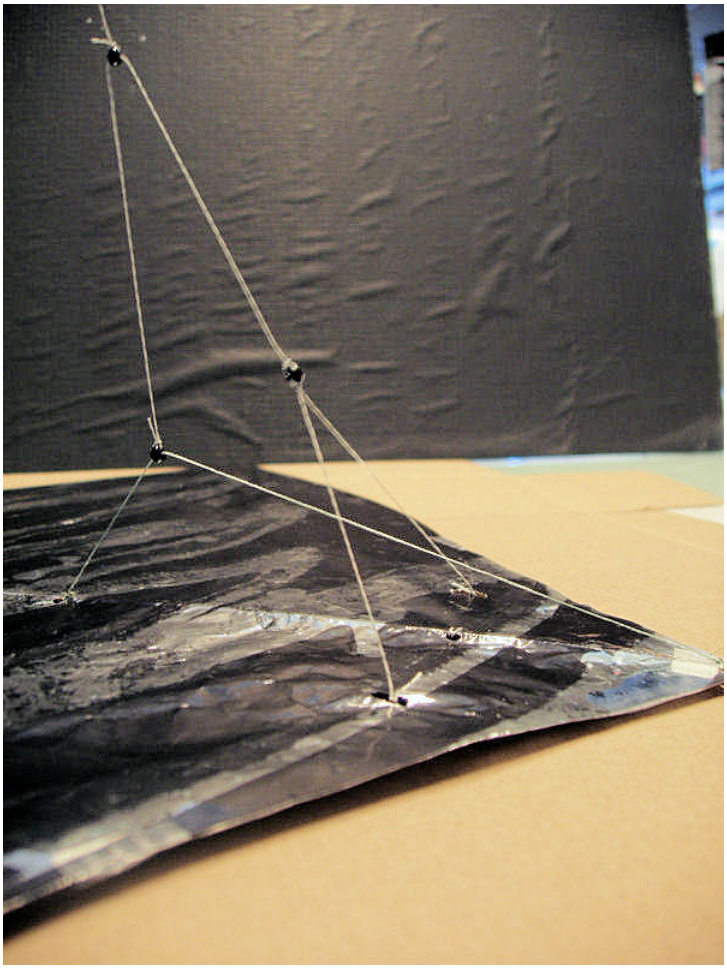
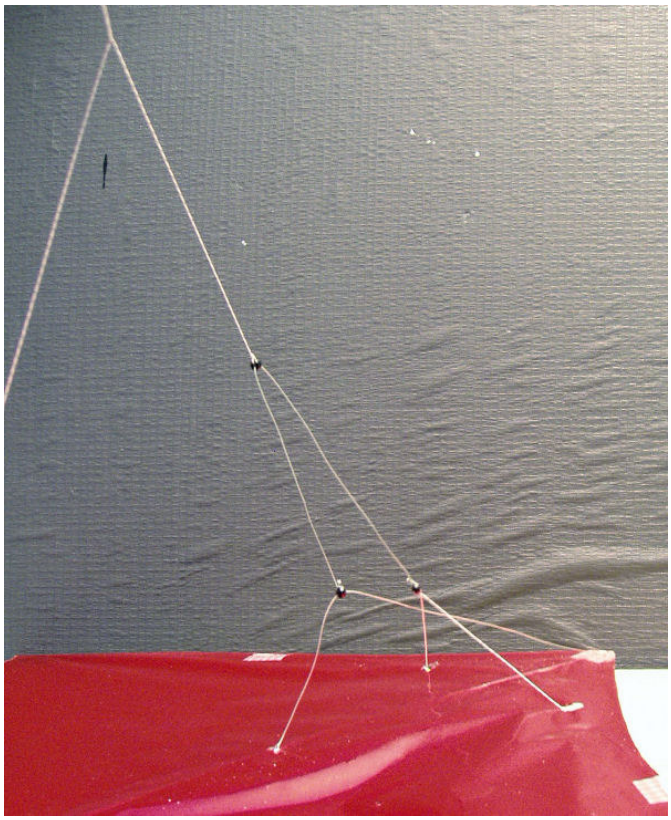
Bead #3 – this bead is secured on BL #3 by a larkshead knot with a twist in the loop, a prussic knot, or a variation. Whatever knot is used, it must secure the bead to BL #3 but must allow BL #3 to be moved slightly so you can adjust the right to left balance of the kite. Also one end of BL #2 is tied to bead #3 using a knot tied through its center hole. Bead #3 has both BL #3 tied through its center hole and also one end of BL #2.



The diagram on the left is of the spine alone. It shows the approximate location along the spine of the key points that are needed for the SN-5 bridle. It also shows, for reference, the relative location of the wingtip line and the bow/spine cross point.





I hope by reading the descriptions of the bridle components and looking at the photos and diagrams you'll have a clear idea of how the bridle is constructed.

I know only too well how easy it is to 'wishful' think yourself in to 'seeing' results that aren't really there during experimenting with fighter kite changes. To find out how or if the SN-5 bridle idea is viable, I decided to fly 5 different kites each with the SN-5 bridle at WSIKF in August 2006. The winds at Long Beach, WA are smooth and make it much easier to determine small changes in flight characteristics. During WSIKF wind speeds ranged from almost zero to around 13mph.

HERE ARE RESULTS OF MY OCEAN WIND TESTING
The SN-5 bridle does work as I thought it should, the kites were noticeably faster during fast line retrieval. ***However, I discovered a 'glitch':***
With the nose portion of the spine held rigid by the bridle, the directional stability of the kite's flight path during fast line retrieval was not as predictable as compared with using a standard 3-point bridle. The kites would occasionally wonder off course.

CONCLUSION
The SN-5 bridle needs to be made in such a way that it allows a specific, but to me unknown, amount of backward bending of the nose portion of the spine in order for the kite to have more predictable directional stability during rapid line retrieval and also increased forward speed.

A CHALLENGE
If you are inclined toward experimenting with fighter kites, this may be a project you'd like to pick up and continue with to find a complete solution for faster forward speeds without ANY offsetting negative feature. If you do work on this idea, please share your progress with me. And if you have questions about what I did, please email me at kitefighter@nwinfo.net.

Biggrins, bruce