

# KITES FOR CONNOISSEURS

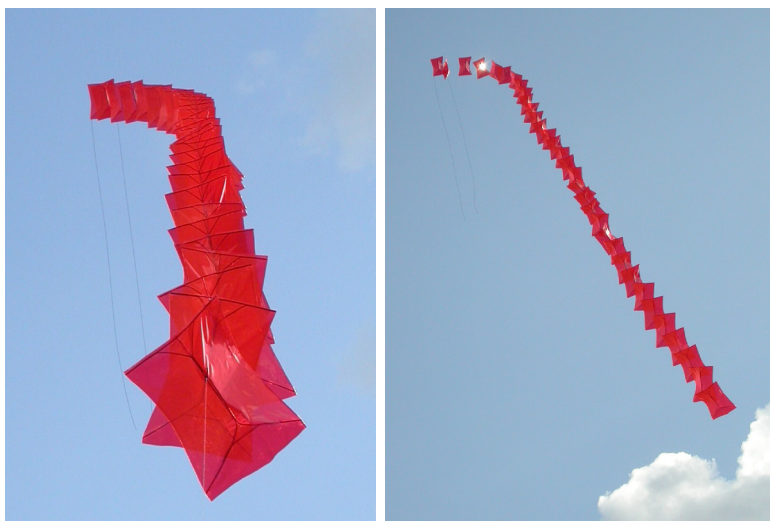
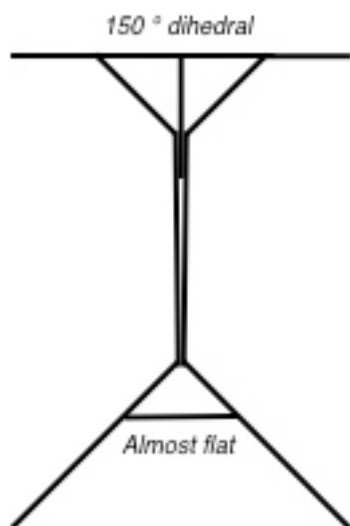
## A-KROSS

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*Kites for Connoisseurs* is a collection of plans for kites designed by Andreas Ågren. These kites often have a unique technical twist. The plans can be found at <http://windman.se/kite-plans> and they may not be used for commercial purpose without written consent.



The **A-kross** is a frame in bamboo for a train of rectangular kites of A3 size. It is unique in that respect that the cells in the train fly steady without a tail. The frame has a 150° dihedral in the leading edge which is flattened out in the trailing edge.

When bending a large number of bamboo sticks it is handy to have a jig. Since a bamboo stick has to cool down in the shape it has been bent, a second jig can be used for this purpose to save time. The first jig is used to bend the stick roughly into the shape. Then the stick is placed on the second jig. When ~20 sticks have been paced on the second jig this is placed in the oven in 140° - 150° C for at least 20 minutes and then left to cool down.

### Material

What you need to start :

- A piece of wooden board for the bending jig.
- A piece a sheet metal, not bigger than it fits in the oven, for the drying jig.
- Nails with small heads
- Two dozens of 60 x 4 mm screws and nuts.
- A hot air gun.

For the frame

- Bamboo sticks (e.g. from a window blind).
- White glue for wood.
- 4 mm eyelets/grommets

For the sail

- Painted or printed A3 paper, plastic or cloth (decorated plastic bags are excellent).

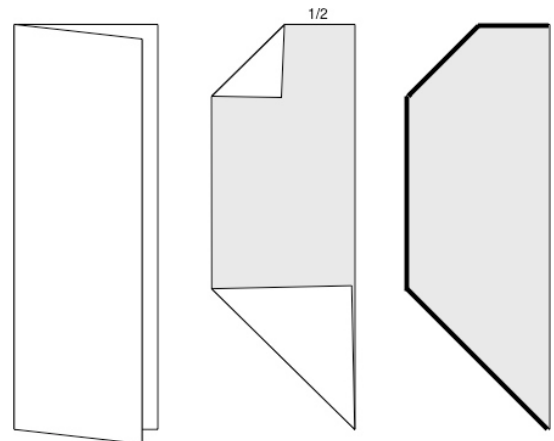
## Preparation

### Jigs

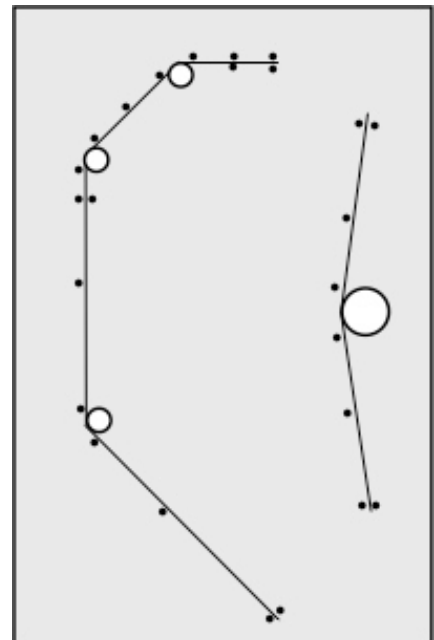
The bending jig can very well be made of board or wood, but the drying jig must be of sheet metal if you intend to put it in the oven for drying the sticks.

#### Bending jigs

1. Create a template for the spine stick by folding an A3 paper according to figure:
  - Fold in half lengthwise
  - Fold the upper folded corner from half of paper width
  - Fold the bottom folded corner all the way.
2. Follow the outline of the folded A3 paper and draw it on the wooden board.

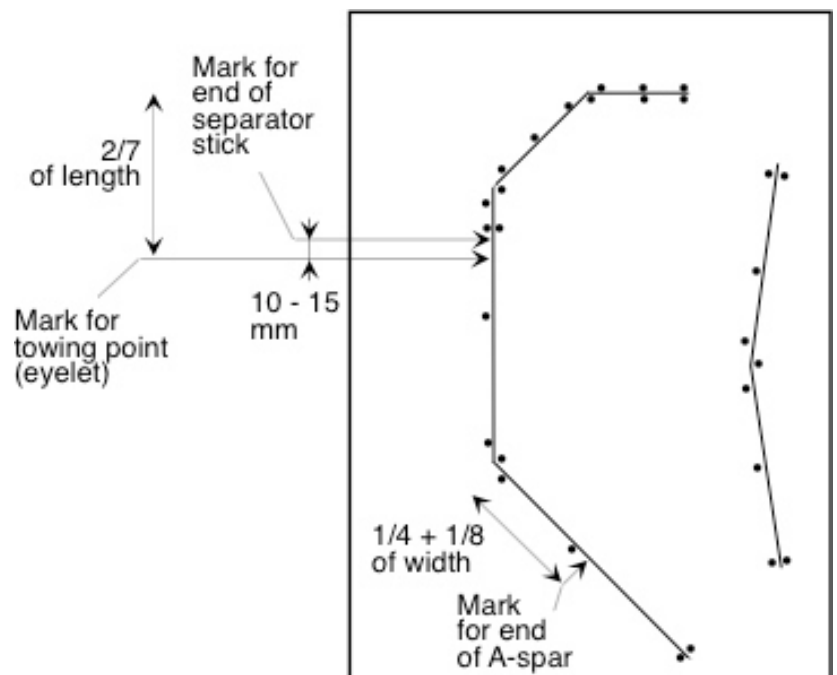


3. Put nails along this line as indicated in figure. To get smoother corners you can use metallic bottle caps in the corners.
4. Draw the 150° dihedral on the board. Put nails along this line as indicated in figure.



#### Drying jigs

5. Draw the template for the spine stick on a piece of sheet-metal.
6. Drill holes along this line as indicated in the figure and fix 4 x 60 mm screws in the holes.
7. Make the three marks for separator stick, towing point and flattening stick (A-spar).
8. Make also marks for the ends of the spine stick itself.
9. Draw the 150° dihedral on the board.
10. Drill holes along this line as indicated in the figure and fix 4 mm screws in the holes.
11. Make also marks for the ends of the dihedral stick.



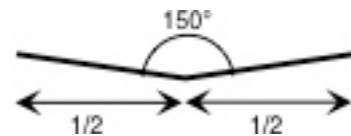
## Making the frame

The frame consists of five parts:

- Two spine sticks (left and right)
- One dihedral stick
- One flattening spar (A-spar)
- One separator stick (between the spine sticks at the leading edge)

### Spine

12. Put the end of one stick in the upper end of the bending jig between the nails and switch on the hot air gun.
13. Start with the first corner and warm the stick with oscillating movements where it is to be bent. Keep a light pressure on the stick so you feel when it softens. When it does, squeeze in the sticks between the nails around the corner.
14. Do likewise with the two other corners.
15. Continue to warm the three corners of the stick for a while with oscillating movements, then move the stick to the drying jig.
16. When the drying jig is full, put it in the oven at  $140^{\circ}$  -  $150^{\circ}$  C for at least 20 minutes.
17. Remove the jig from the oven and let it cool down
18. Put marks on all sticks aligned with the marks on the jigs before removing the sticks from the jig.
19. Bend each stick slightly to check that it doesn't break.

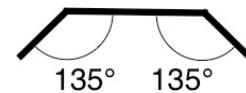


### Dihedral

Make the dihedral piece in the same way the spine piece.

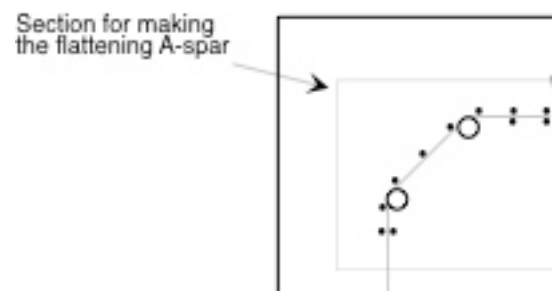
### Flattening piece

Make the flattening piece (A-spar) in the same way as the spine piece, only use the top part of the spine jig.



### Dihedral

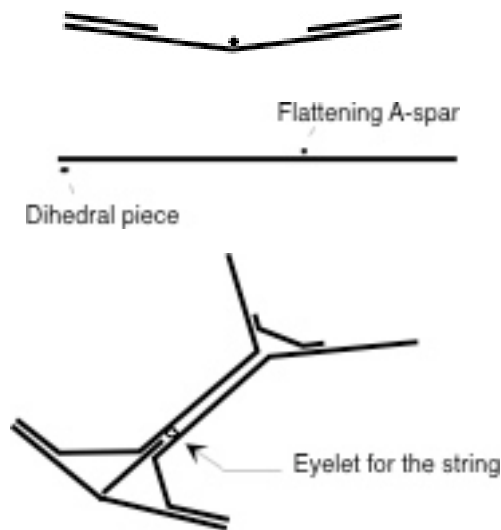
\* Make the dihedral piece in the sa



### Assembling the frame

When drying the glue, use pegs to keep the bamboo sticks in position. Before glueing, bend each stick slightly as a quality check.

20. Cut the spine piece and the dihedral piece to length according to the made marks.
21. Glue one dihedral and two spine pieces together and let it dry. The spine piece should be on the “inside” of the dihedral, i.e. the dihedral is to be closest to the sail.
22. Cut the separator stick to length (10 cm for A3 size) and glue it in position between the two spine sticks. Glue the other end of the inside of the dihedral, right in the middle. Let it all dry.
23. Cut the flattening piece to size and glue it onto the spine sticks. Put a drop of glue also between the spine sticks and let it dry.
24. Finally attach a 4 mm eyelet (for the line) at the towing point and put a drop of glue between the spine sticks just below the eyelet and let it dry. The eyelet is for pass-through of the flying line to let the kite move freely and for keeping the line in position within the frame.
25. Test each frame for quality by bending it slightly.



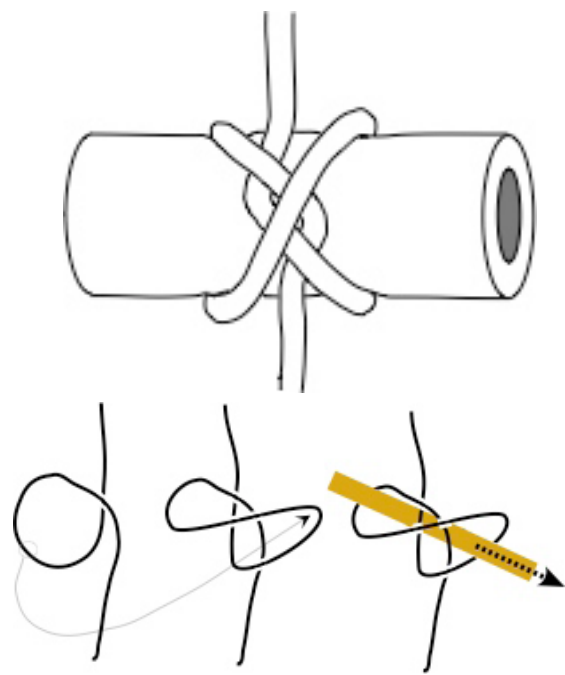
### Sail

Cut the sail to size and glue the sail onto the passed frames.

### Line

A suitable distance between the kites on the line is 1.5 - 2 times the height of the kite. If all kites are decorated in the same way, keep them close, if they are different, have some distance between them. To get the kite on equal distances make marks on the flying line.

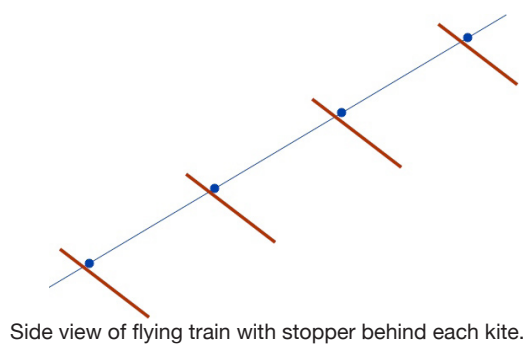
To keep each kite in position on the line, tie a “constrictor” knot around a short piece of thin PVC covered electric wire. The “constrictor knot” (from the Ashley book of knots) is a much safer knot than the similar “clove hitch” knot, and it squeezes the PVC so everything stays in place. The “constrictor” knot may, like the “clove hitch” knot, well be tied in the hand by bending two loops. This is easier to do than to describe, see figure.



This piece of wire just acts as a stopper for the kite, i.e. the kite itself is not tied to the line. The kite is free to move around the line (and actually also to slide downwards to the previous stopper).

### Flying and A-Kross Train

An A-Kross kite train prefers light wind, and it can fly in quite a high angle. The top kite might need a pair of thin strings or yarn as tails, mostly for visual effect. Keep away from other kite lines as you fly. This kite literally chews kite line, and within seconds after crossing another line you have got a magnificent, friendship-creating tangle.



Side view of flying train with stopper behind each kite.

## **Background**

*- In 1992, before I had any experience with kites at all, I joined the group Sala Kite & Tango Party on their trip to Cervia. We were 17 people going there, and as a preparation we had made a kite train of the cards in a Tarot deck. The cards were made as Della Porta kites that require long tails. A Danish "kite expert" had recommended a complicated bridling system where in addition to the top lines running through the top corners of each kite there should be two lines from the centre of each kite going to the top corners of the kite in front.*

*- At the beach of Cervia the group struggled to get the train airborne. Each launch trial resulted in a mess of tails and bridle lines that took half an hour to sort out. After several hours in the burning midday sun, only after attaching a powerful lifter we got the train airborne.*

*- Back home I pondered on this experience and realized that to minimize the risk of tangle there should be no tails and only one single line going through all kites. Furthermore the kite should be balanced to fly on single point.*

*- In 1994 I had got the construction ready and made a train where the sails were authentic placards from the local newspaper that happened to be in A3 size.*

*- This Paper Kite won me the same year the Gold Medal in Drakfesten på Gärdet (the Stockholm kite festival organized by Konstfack, the Art School of Stockholm), a prize that is still my most treasured one.*

*- One nice memory with the Paper Kite is flying it at Bandar Lampung kite festival 1995, which was part of the Indonesia Kite Tour 1995. As I was flying the train a grey haired Japanese gentleman came up to me and said: "Your kite look like mine but your's have no tail!" I took this as a great compliment. This gentleman was Eiji Ohashi, and that was the start of a long friendship.*

*Andreas*