

KITES FOR CONNOISSEURS

HUMBLEBEE

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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 origin of **HumbleBee** is simply that the name as such popped up in my head. Possibly because the Swedish word for Bumble Bee is *Humla*. I had the name so just needed to make the kite. Colours are inspired by the *Dark Earth Bumble Bee*.

The HumbleBee has too small wings in relation to the body to be able to fly. But don't tell her: just wait for a fairly good breeze (4 m/s) and swing her up in the air.

Material

- Ripstop scraps
 - Black
 - Orange
 - White
 - Yellow
- Black dacron 2 x 14 cm
- Fiberglass rod:
 - 1.6 mm, 200 cm (or 1.5 mm, 200 cm) Recommended is to use wrapped fiberglass which has a higher friction (for the tube connectors to stay in place better).
 - 1 mm, 50 cm
- Carbon fibre rod
 - 2 mm, 60 cm
- Ferrule 1.6 - 2 mm

Making the *HumbleBee* kite.

(Updated May 16, 2022)

The templates for HumbleBee are split in three A4 pages in horizontal orientation. Two of the pages need to be glued together for the body template (the blue slanted lines in the middle of the body are guide lines for perfect aligning), which should be 36.5 cm high/long when glued together. Make sure the printer prints out the pages correctly.

1. Cut out the templates for the body, the wings and the eyes.
2. In the template for the body punch the six holes along the edge for 'Wing front' (C), 'Wing rear' (B) and 'Bridle' (A), as well as the 'Top bridle point' in the middle (between the two C's).
3. Cut six strips of ripstop, all 23 cm wide but in different heights (which include 7 mm double seam overlap):

Any combination of stripe colours and stripe heights will do but the total height should be at least 46.5 cm before sewing the pieces together and 37 cm after sewing the pieces together.

Black

- 8.0 cm
- 8.5 cm
- 11.5 cm

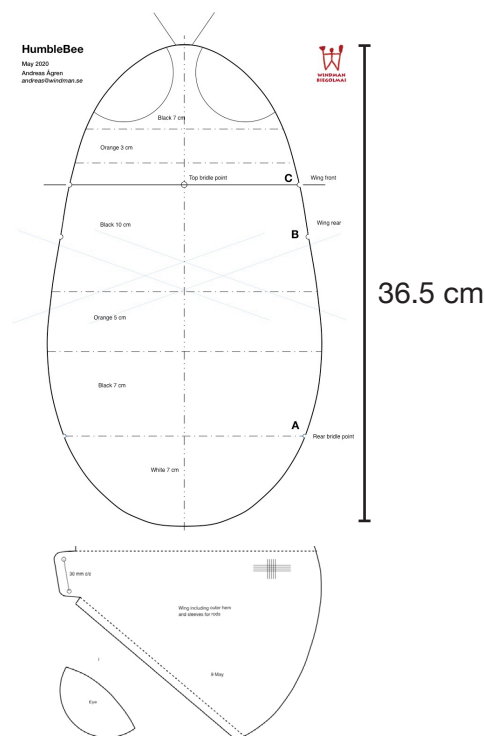
Orange

- 4.0 cm
- 6.5 cm

White

- 8.0 cm

4. Sew the strips together from top to bottom:
 - Black 8.0 cm
 - Orange 4.0 cm
 - Black 11.5 cm
 - Orange 6.5 cm
 - Black 8.5 cm
 - White 8.0 cm
5. Cut out the body using the body template.
6. While the template is still on the ripstop mark the 'Top bridle point' on the ripstop for future reference.



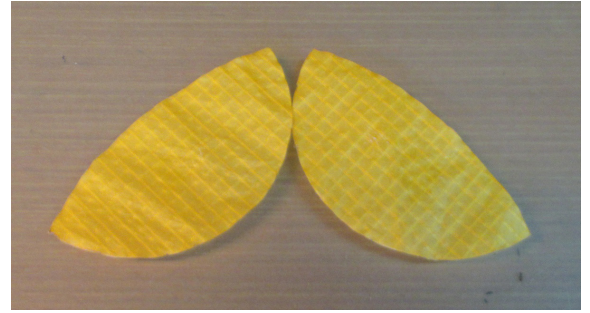
Back side



Front side



7. Using the templates for the eye cut out two pieces of ripstop in orange, yellow or white (or any other colour).

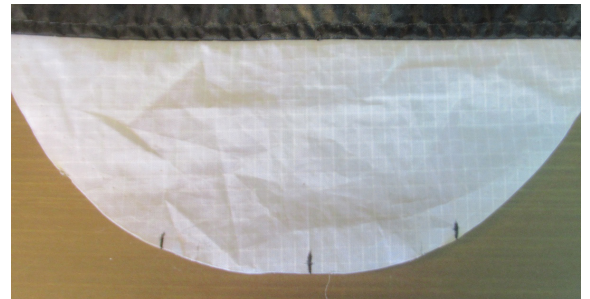


8. Sew the eyes to the body with 5 mm overlapping.



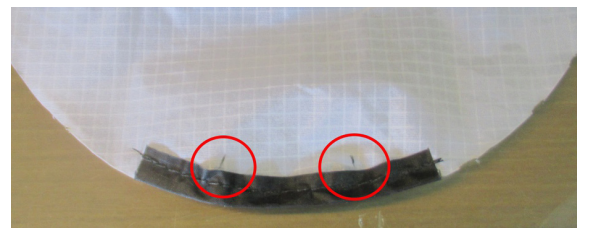
9. Prepare two edge binders, both 2 cm wide :
- One 88 cm long. This will also work as a sleeve for the frame fiberglass rod.
- One 8 cm long.

10. Find the middle point on the rear edge of the body and make marks 4 cm on each side.



11. Sew the shorter edge binder over the rear edge of the body starting at one 4 cm mark.

12. Make two new marks 2 cm just inside the ends of the rear end binder (i.e. 2 cm from the middle).



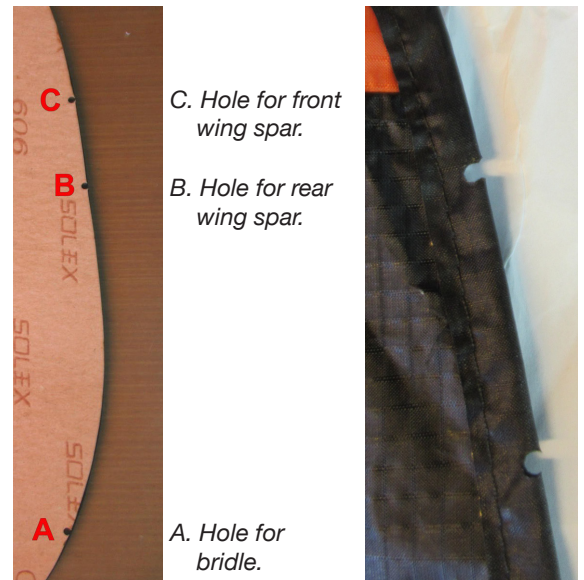
13. Sew the long edge binder around the body starting at one of the 2 cm marks.

The binder should end at the other 2 cm mark. If it is too long just adjust the length of it.

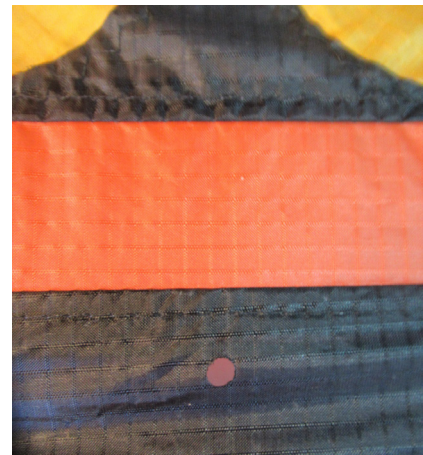


14. Use the template to mark the location of the six holes along the edge plus the hole for the top bridle point. As reference use the previously made mark for the 'Top bridle point'.

15. Punch the six holes in the edge. Note that the holes open the edge. Hole diameter 4 mm.



16. Punch or burn with soldering iron the hole for the upper bridle point. This hole may be slightly larger: 5 mm.



Prepare the two antennas: The antennas are folded dacron with fiberglass rod inside.

17. Cut one piece of black dacron 20 x 140 mm for the antenna pockets.

18. Fold the piece at 75 mm from one end, letting this end protrude 10 mm.

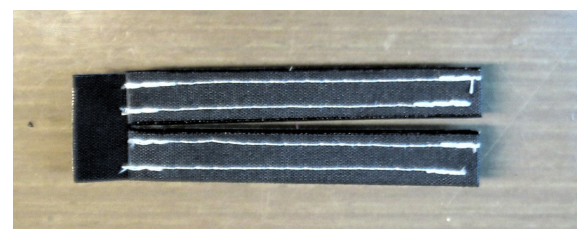
19. Sew four seems along the long sides to create the two pockets for the fiberglass rods.

(White thread has been used here for purely pedagogical reasons.)



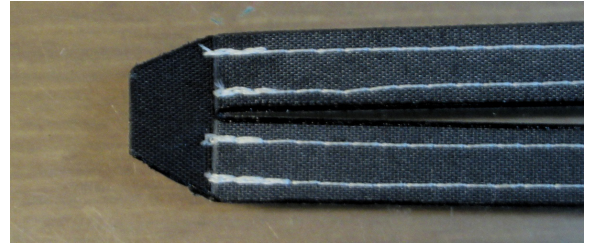
One end protruding 10 mm.

20. At the protruding end: 10 mm from the end make long cut in the middle to make a V.



21. Cut 5 mm of the corners at the protruding end.

Check that a 1 mm fiberglass rod can be inserted into the antenna pockets.

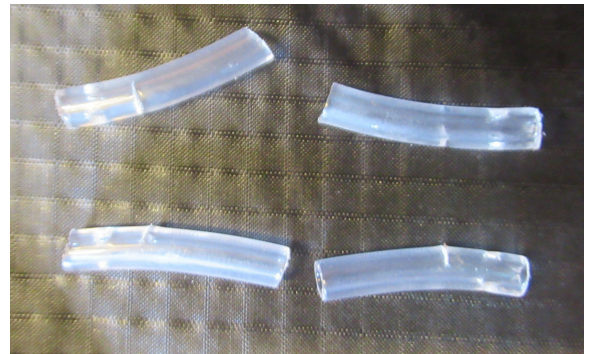


22. Sew the unsplit end to the backside of the body with the protruding part nearest the ripstop and the pocket opening facing up. Align the pocket opening with the seam for the sleeve behind the antenna. Sew the upper seam just outside the pocket openings.

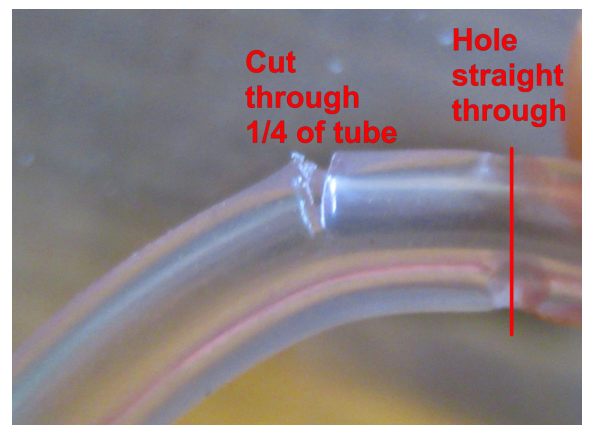


23. Cut four pieces of soft plastic tube with 2 mm inner diameter, all 20 mm long, for wing connectors.

24. On all four of them punch a 1 mm hole straight through, 5 mm from one end.



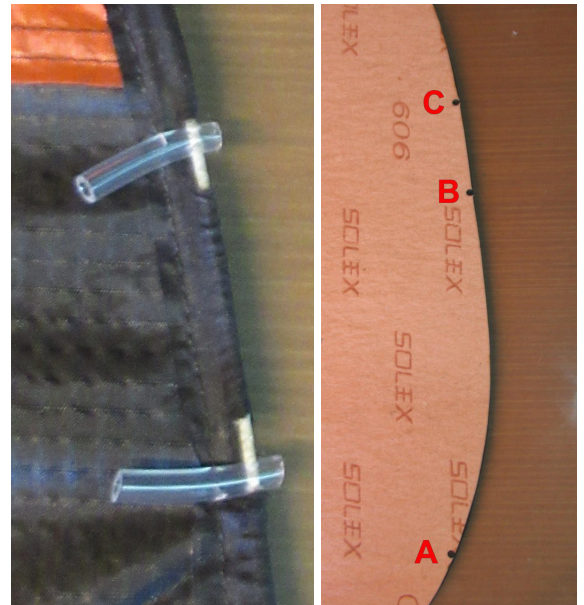
25. Then on the side of each piece of tube make a small cut using a nippers 5 mm from the hole, only through 1/4 of the tube. Note that this cut opens the side of the plastic tube so the tube can be easily bent.



26. Cut from a 1.6 mm (or 1.5 mm) fiberglass rod a piece of 91 cm length.
27. Insert the rod gently in the edge binder/sleeve, starting from the bottom. At the punched holes for the wing spars push the rod through the plastic tube connectors through the small holes in the tube. Make sure the tube connectors come on the back side of the body as the picture shows.

Pushing the rod through the sleeve and sliding the sleeve and the connectors along the rod is fairly hard to do, but little by little it can be done.

28. In the template picture above the holes are marked from bottom and up A, B and C.
 - A. The lowest hole is for a bridle and should not have any connector.
 - B. At the hole in the middle insert the plastic tube so the cut is facing down.
 - C. At the upper hole turn the plastic tube so the cut is on the upside



Connectors in holes B (lower) and C (upper). From bottom and up: holes A, B and C

29. Continue to push the rod through the sleeve at the other side of the body. At the holes in the sleeve push the rod through the plastic tubes in the same manner taking note that in the upper hole the cut should be on the upside while in the middle hole the cut should be on the downside.

Make sure the two fiberglass rod ends meet exactly in the middle of the bottom of the body.



30. Prepare a 1.6 - 2 mm ferrule: On the middle of the ferrule give it a light knock so it bends a few degrees.



31. Insert one of the ends in the ferrule and then carefully also the other end into the ferrule.



32. Use the template to make sure that the positions of the connectors are in the exact positions of the holes in the template side and that they are absolutely symmetric on both sides. **This is crucial for a balanced flight!**

The top connectors must be absolutely in level and the distance between the connectors on the same side should be 40 mm exactly.

33. Cut a 60 cm piece of 2 mm carbon rod for the front part of the wings.
34. Insert it through the upper plastic tube connector. The carbon rod should pass between the ripstop and the fiberglass frame and then out through the small cut in the upside of the tube.

This will also be fairly hard to do, because the tube connector is rather narrow, but using a narrow plastic tube means the connector will be more likely to stay in place.

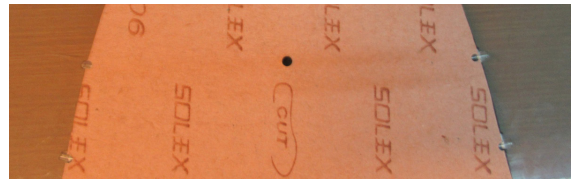
35. Push the rod also through the connector on the other side: first through the cut at the upside of the tube and then through the tube and under the fiberglass rod.

36. Mark the middle (30 cm) of the carbon rod with permanent marker and make sure it is directly above the hole for the top bridle point.

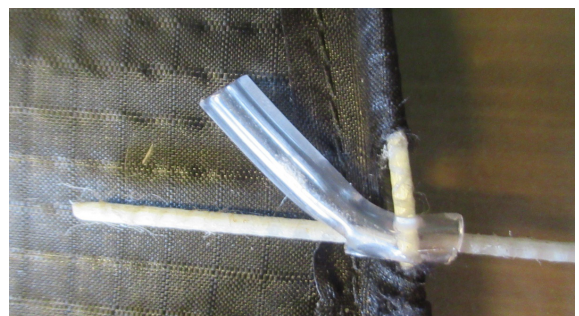
37. Cut two pieces of 2 mm fiberglass rods, both 37 cm long, for the rear part of the wings.
38. Push one fiberglass rod through the lower plastic connector. The wing rod should pass between the ripstop and the fiberglass frame and come out through the cut in the side of the plastic tube.

39. Repeat for the rear wing rod on the other side.

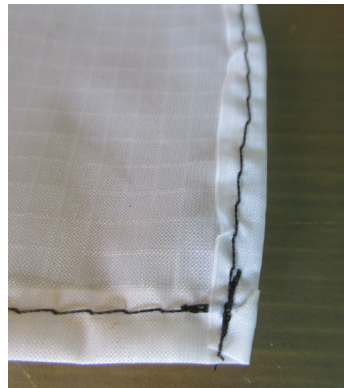
The ends of the rods should reach the other side of the body, but for the time being the ends will be left loose.



A piece of white tape makes it easier to make the mark.



40. Cut out the two wing parts on white ripstop according to the template (actually, since the colour scheme of the HumbleBee is inspired by the *Dark Earth Bumble Bee* which has dark wings, brown or any dark ripstop can be used). Note that the wing parts have a 'strap' with two holes for securing the wing onto the body.
41. Punch the marked holes in the strap with a 4 mm punch.
42. Fold the upper edge according to the dotted line on the wing template. Sew the upper sleeve for the front rod.
43. Fold the lower edge according to the dotted line on the wing template. Sew the lower sleeve for the rear rod.
44. Flip the wing over and on the reverse side of the material hem the curved edge (thus closing the sleeves).
45. Repeat for the second wing, but observe that the hem and the sleeves should be mirrored: i.e. put on the other side of the material compared to the first wing.
46. Slide one wing over the two wing rods with the strap on the back side.



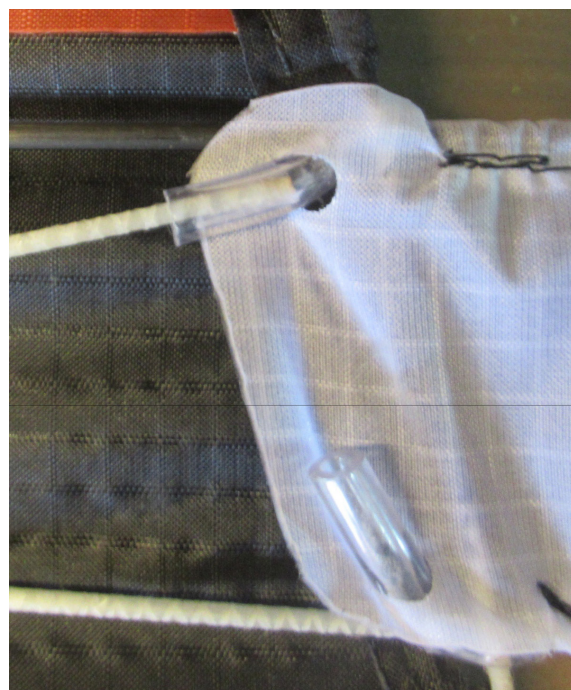
47. Slip the strap of the wing over the tube end (insert the tube in the hole in the strap) at the upper connector, then do the same for the lower connector.



48. Repeat for the second wing.



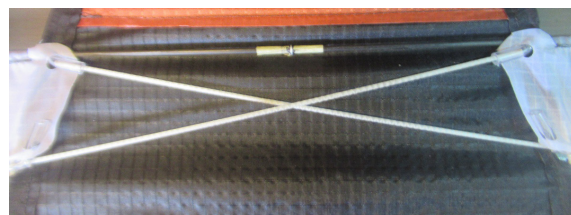
49. Insert the end of one rear wing spar into the front tube diagonally across the body.



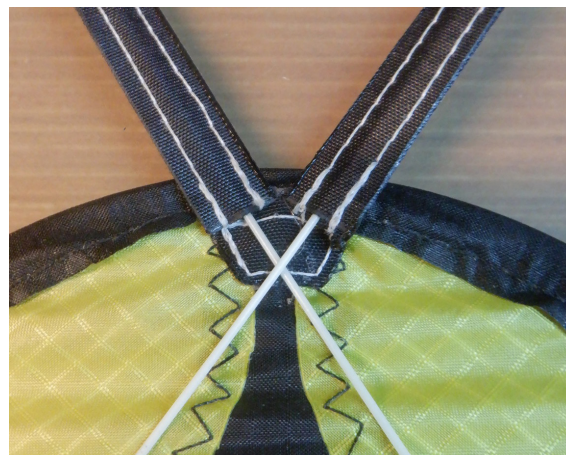
50. Then do the same for the other rear wing spar.

Check that the spars are straight and cross right under the bridle hole.

The wings are now firmly secured to the body.



51. Cut two pieces of 1 mm fiberglass rod, 22 cm long, for the antennas.
52. Insert them into the pockets for the antennas, all the way to the top.



53. Pull the antenna rods in a cross under the front wing spar and also under the rear wing spars.



54. Anchor the other end in the free end of the plastic tube connector for the rear wing spar. The antenna rods should be straight, not bent. If they are bent shorten them a couple of millimeters.

55. The assembling is complete. Check again that the wing connectors still are in the correct positions.



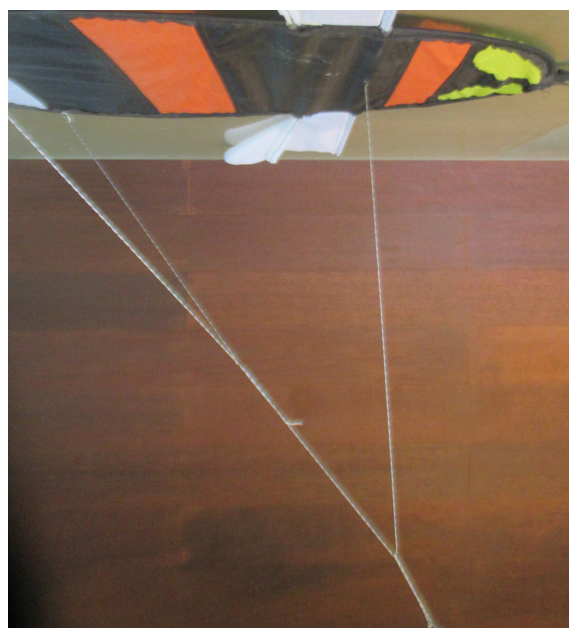
Bridle

The HumbleBee uses a 3-point bridle.

56. Cut two pieces of a thin string (<10 kg), both 50 cm long.
57. Tie the ends of one string around the frame through the free rear holes near the white field (labeled A previously).
58. Tie a short loop in one end of the other string and tie this loop with a Prusik knot on the middle of the first string. Tie the other end around the marked center of the front edge wing rod, through the centre hole.
 - Cut 15 cm of the same kind of string and tie a loop. Tie this loop with a Prusik knot on the front string as a towing loop. The towing point is just a little bit in front of the centre hole. Start by putting the towing point in 90° angle under the front centre hole and then move it forward 1 mm at a time until the kite launches well and maintains a good flight.



Three point bridle.



Towing point just a little bit in front (to the right) of the front bridling point.

Flying

If the kite doesn't fly straight but keeps going to one side, the cause is probably unsymmetric wing mounts.

To help solving this it might be good to have the centre section of the body template available at the kite field: Just put the template portion on the kite with the centre hole for the top bridle point as reference and check that the wing connectors are in correct position. The distance between the connectors on the same side should be 40 mm exactly.

If the wings are symmetric but the kite still doesn't fly straight then adjusting the bridle should solve this: move the rear Prusik loop slightly to the same side as the kite tends to go. Usually a question of millimeters.

The HumbleBee needs a wind speed of 4 m/s and will fly well up to 7 - 8 m/s at an angle of 55°. At about 6 m/s the wings will start to flutter.