HOT CANARY

Hot Canary spans one metre – and is 1100mm long. Original was powered by an OS 46 SF ABC.

From Belgium comes Stefan Van Nieuwenhove's sports scale racer for .45 to .50 motors

Unusual proportions of Hot Canary shown to advantage in this view.

I ALWAYS have had an interest in obscure aircraft and in pylon racers (the real ones). So why not combine the two? About two years ago I drew the plans for this aircraft but because of lack of time (the eternal nightmare of a model builder) it was put away.

After misfortune eliminated one of my models I started looking for a replacement. When stumbling on Hot Canary plans I knew it was now or never.

Due to my very sparse documentation I would class this aircraft as sport-scale. The two major (intentional) modifications to the real aircraft are the shape of the headrest and of the wingtips.

Construct your Canary

This aeroplane is relatively easy to build thanks to its boxy fuselage, straight wings and the absence of struts; the most difficult part being the cowl. For this I decided to go the whole way by making male plug, a female mould in two parts and finally the cowl itself in glassfibre-epoxy. For a one-off however, the use of the 'lost foam' mould method is advisable.

One important note to keep in mind: keep the front end light! Due to its long nose and short tail getting the CG right can be a problem, as I found out.

Fuselage

Due to the depth of the fuselage several sheets of 3mm balsa have to be glued together. This can be done the following way. Place two sheets edge to edge. Put adhesive tape over the joint on one side, fold open, apply PVA-glue, close fold again and remove the glue oozing out of the joint. After setting, the tape can be removed.

Next cut the 3mm balsa and 1mm plywood fuselage sides to size. 0.8mm

ply can also be used if 1mm ply is not available. Cut lightening holes in the ply sides avoiding the areas where the formers will touch. Glue the balsa and ply sides together using slow-setting epoxy. At the rear of the fuselage a piece of 1.5mm balsa with the grain vertical has to be glued to keep the fuselage sides from splitting under to tailplane stresses. Be sure to make a left and a right side.

Glue the balsa triangles on top and bottom of the fuselage sides and fit the small ply pieces which will align the wing hold down plates. Next cut out the formers from 3mm ply. Now the fuselage can be assembled. If using a commercial engine mount the firewall should be doubled to 6mm ply and some reinforcement in the form of glassfibre and/or triangular stock should be added to the corners. Also adjust the place of the firewall to the length of the engine used and to the type of engine mount. If opting for the hardwood bearers do not omit the ply triangles.

Next fit the 2mm balsa bottom covering. Note that the grain has to run from side to side and not from front to aft. At the places where this covering has to be butt-joined, strips of 3mm balsa can be glued in the fuselage from side to side to support the joints. Leave off the top covering until all vital things like fuel tank, radio placement and control runs have been finalised. Place the radio equipment as far to the back as possible. It might be worthwhile to build in the option of putting the battery pack in the tail.

Glue on the top covering and build up the cheeks. This does require some trial fitting of the 1.5mm balsa covering. Finally slide and glue the 3mm ply using hold-down plates.

The tail surfaces

These are made from 6mm balsa. Glue two sheets together and cut out tailplane-elevator and fin-rudder in one piece, afterwards separating at the hinge line. To make a nice close hinge line I use the following method. First sand the leading edge of the moving post to a rounded shape, then wrap a piece of sanding around that edge. With that custom made sanding block the trailing edges of the fixed parts can be sanded to a hollow section.

The two elevator halves can be operated by two different pushrods, joined by a piece of hardwood or by 2.5mm music wire formed in a U-shape. I prefer the music wire because it is the least noticeable although it does introduce some play due to tension. This has never proven to be a problem though in any of my models. These were the control horns are placed on the control surfaces a piece of thin ply can be glued to avoid crushing the balsa and to spread the loads.

The wings!

These are very straightforward as they are untapered and are the same size. Only the bottom wing features ailerons. Place the bottom spar on the building board and place all the ribs at the proper spacing. Put a strip of balsa under the trailing edge of the ribs to keep them horizontal. Next add the top spar, the leading edge, the 1.5mm balsa webbing and the 3mm ply centre piece and the top covering. Remove the wing from the building board. Before gluing on the bottom covering, place the wing in its cutout in the fuselage and put the hardwood dowels in the holes. If necessary adjust the holes in the ply centre piece. When correct glue the dowels in the wing.

Finally glue on the bottom covering. You will note that the trailing edge is left thick and blunt. This is to ease construction (I hate to sand trailing edges to a sharp edge) and does not affect flight performance adversely. Do not round off the trailing edge but leave the corners sharp.

Glue the 3mm ply piece through which the wing bolts pass on top of the covering. Put the wings on the fuselage and drill through to the wing hold-down plates, the ailerons can be built separately from the bottom wing on a flat plate. The small parts of the fuselage that are attached to the wings are made with the wings in place. Do not try to make an invisible gap as a little play is needed to get the wings in place during assembly.

The undercarriage

For a couple of years now I make my undercarriages in glassfibre-epoxy where normally an aluminium example would be used.

This can be done the following way. Cut two pieces of glassfibre weave. One piece with the fibres running 0-90 degrees and the other -45/+45 degrees (see plan). The -45/+45 degrees weave is needed to get the necessary tensional stiffness. The shape of the pieces assumes that the resulting landing gear will be thickest in the middle as the bends closest to the fuselage are the most stressed. The number of layers needed depends on the weight of the airplane and the weight of the glassfibre and some experimentation is needed here. The weaves I have used up till now are 350gm/sq.m. and 160gm/sq.m. The lighter one seems to make possible a thinner undercarriage for the same strength. If uni-directional fibre can be found this could be used instead of the 0-90 degrees layers giving a better strength to weight ratio. Carbon fibre has not been used until now due to its cost and its low elasticity.

Next cut up the two pieces in strips a little wider than the width of the undercarriage (for example, cut strips of 5cm when a width of 4cm is needed).

The first items you need are two pieces of plastic (I use the Solarfilm backing) which are coated on one side with a release agent and a form which

Hot Canary looks a fast performer from any angle. Turns best when rolled to 90 degrees and pulled through with elevator.

has the contour of the desired landing gear. For this I use a piece of white foam cut to shape. Did I forget to mention the epoxy? Select slow setting, 24 hours epoxy which becomes neither rock hard (brittle) nor stays soft. A compromise is needed here.

Now the lay-up can begin. Lay down one of the plastic pieces on the table with the coated side up. Give a coat of epoxy and lay up the first glassfibre strip. Impregnate with epoxy and lay up the next strip (see why they call it a lay-up?). This should be done in such a way that the 0-90 degrees weave will be on the outside of the lay-up and the -45/+45 degrees weave in the centre (see the numbering on the drawing). When finished put the second piece of plastic on top of the lay-up with the coating down. Now press this package between two pieces of wood. This will lower the epoxy content by squeezing out the excess because in a hand lay-up there is always an excess of epoxy. Due to the pressure the excess epoxy will flour to the edges which will later be cut away.

Now pick up the package and wrap it over the mould while at the same time stretching the plastic on the inside of the bend. This will lessen the chance of ripples on the inner surface. Next comes the most difficult part: leave it to set for at least a week as epoxy does not reach its final strength after 24 hours. This hardening process can be speeded up however, if the temperature is increased.

Another method has also been in my mind, but I have not tried it yet. Instead of cutting up the tow pieces of glassfibre simply fold them up. This can present some more difficulties however. Such a thick package is more difficult to impregnate and some way of curing under pressure (vacuum bag?) would probably be needed to keep the layers from separating (due to the folds).

All that is left to be done now is saw and sand the undercarriage to the desired shape, drill the holes, fit the wheels and try it. (This does not mean you have to make bad landings on purpose!).

Finishing

To speed up things I finished the fuselage with yellow Solarfilm. The tail surfaces are also covered with Solarfilm and glued in place afterwards. The numbers on the fuselage are cut from white and black Solarfilm and do require some effort but do liven up the model considerably.

The cowl, landing gear and canopy edges are spray painted, as is the blue decoration. The black pinstriping around the blue is done with thin tape.

The wings are covered with colourless Solartex and spray painted. The number on the top wing is also sprayed on using special artist's masking sheet to get the desired shape.

To balance the aircraft screw two small woodscrews at the correct place in the fuselage sides. Slip a metal tube of suitable diameter over the heads of the screws at each side and lift up the model.

Flying – the interesting part!

The weight had gone higher than hoped (doesn't it always?) and the need for huge amounts of lead in the tail didn't make me feel better. The model was originally designed for my Laser 45 four-stroke but during construction the suspicion grew that this would not be powerful enough. Nevertheless I decided to go ahead before making modifications to suit a new engine.

To keep weight down and to have easy access to the engine the cowl was left off for the first flight which also reduced the amount of tail ballast needed (double again!). This first flight proved to be a anticlimax with a take-off straight as an arrow and a slow climb-out. Some circuits were flown but no aerobatics were tried due to an obvious lack of power. Landing was rather fast but uneventful.

Satisfied with the flying qualities I started the modifications to fit a stronger engine. A larger tank was fitted and the carburettor control make recounted to suit the new OS 46 SF ABC. A muffler was constructed in aluminium (a good friend did the welding for me) to fit inside the cowl, and a new (lighter) cowl was made in an effort to lessen the weight at the front but in the end still almost 100 grams of lead was needed in the tail.

How does it fly now? During take-off and the first moments afterwards some right rudder has to be fed in to prevent a swing to the left. Using ailerons here is of no use. Turns to the left are easy, turns to the right, however, always make me a little nervous, as they don't 'feel' right!

Could it be because of the nature of the bird (pylon racing)? Do not expect immaculate aerobatics from this aircraft. Rolls are fast and straight and can be kept going forever with a little up and down elevator at the right moments. Snap rolls are lightning fast. Inverted flying does require very little down elevator but a tendency exists to upright itself in the turns, so that opposite aileron sometimes is needed.

Do not let the aircraft get too far away from you, and get used to the look of the airplane before trying anything special as it can get difficult to see its position due to its rather unusual layout. The landings are quite straightforward as long as the speed is kept up a little.

Until now I have not made any three pointers. Due to the position of the undercarriage jumps are rare but it does want to lift its tail occasionally on rougher surfaces.

The control surface deflections on my model are as follows:

Ailerons: 15mm up and 15mm down
Elevator: 15mm up and 15mm down
Rudder: as much as possible

This plane definitely is for the more experienced pilots who like a different aircraft and don't mind having their thumbs kept busy!