Building a Wake « Retro »

The Vibrant, a veteran Wakefield from 1948, studied and designed by René Jossien.

In 1928 an English lord, Sir Charles Wakefield, set out the rules of a international competition for all motorised models. Given the great success of rubber-engine powered models, the competition, known as the Wakefield Cup, was only open, as from 1934, to elastic models. The essential rules are: wing area: 200 sq. in. +/- 10 sq. in. (12.9 dm +/- 5%); minimum total weight 4 oz. (113.5 gr.); minimum area of fuselage main frame = L2/100 (L is the total length of the model).
As of 1937, the total minimum mass was changed to 8 ounces (227 gr.), the other characteristics remaining mandatory. In 1938 the area of the stabilizer was limited to 33% of that of the wings.
From 1951 to 1953, these measures became international: total minimum weight: 230 gr; total projected area of airfoil, wings and stabilizer = 17 to 19 dm²; fuselage main frame: 65 cm² (whatever the length). From 1934, all the elements of the craft (except the gear-wheels, if any) had to be built by the modeller. It is a pity that this obligation was not kept after 1953.

Building the fuselage

Cut out the side view of the fuselage and position it correctly on the construction. Place thin sheets of polypropylene on the airfoil to prevent the sides sticking to it. Stick with adhesive strips, taking care not to snag the sticks while building.
Choose a dozen 4x4 sticks, some fairly hard, others softer. Sand them all together, varying each surface, so as to have identical thicknesses.
Choose the four hardest sticks for the longerons. Mark them at their extremities with a coloured felt-tip pen to distinguish them from those reserved for the vertical uprights and the horizontal braces/crossbars/cross-pieces. Determine the heavier side and put this in the front. Always try to lighten the rear of elastic-engine models.
You can, as I did, build the flanks of the cowling at the same tome as those of the fuselage. Prepare 3x3 sticks, relatively soft, as the cowling is purely decorative and thus not under stress.
Also sand the 10x10 balsa, vertical grain, which forms the resistant flanks of the cowling. This operation is to be done after sticking several strips of 10x10 to correspond to the length of the cowling.

Tip: first build the two flanks of the fuselage, with 4x4 sticks, with the corresponding disconnection at the cowling. Then the shapes of the flanks of the cowling are to be cut out and adjusted. Then, on the frame, on the right-hand side of the cowling, stick 3x3 sticks(yes, 3x3 + 10x10 = same thickness as 4x4). For the left-hand flank, place the 3x3 sticks first, and then the shape in 10x10 last.

Precision: the notch for the passage of the wings will be cut out last of all to keep the cowling's rigidity for as long as possible (including after covering with canvas). Note that the reinforcement in 15x10 balsa, width 15, stuck in the axle, under the brace/cross-bar, has been added last to make the cowling a little more rigid, as it has become too supple after emptying the flanks. Once the two sides of the fuselage have been built and dried – with their extras intended for the cowling – separate them in order to mount the fuselage as seen from above. The central part, of constant width, favours joining the sides by the braces/cross-bars. For the cowling part (still attached to the real fuselage), the braces/cross-bars are 3x3, except for those in front and behind, which are wider and triangular. When the fuselage is properly

assembled, separate the removable cowling, whose attachments to the fuselage are to be studied according to the possibilities. as for me, I chose a horizontal circlip at the front, and this circlip being blocked in an upside-down U, projecting above the fuselage. At the rear, two lateral circlips block the rear of the cowling to ensure good harmony with the fuselage. These circlips are made of 5/10 CAP, whose elasticity can be profited from. Finish building the fuselage with the frameworks, stay-plates, reinforcements front couple in CTP (with the piqueur and banking close together, as given on the plan), the aluminium tubes for the under-carriage and the CTP rings, reinforcements to rear attachment of engine. The passage holes for wing attachment billets are to be pierced last of all, when the plane is totally finished, the engine in place in function of the centring to be respected, with the centre of gravity having to be situated at 70% from the wing cord.
All sticking of wood is to be done with vinyl glue. Sticking of the hooks and tubes with cellulose. Canvas covering in Japanese vellum or modelspan, black in colour;

Building the wings
Absolutely classic building, but first of all, the longerons of the double dihedrons are cut out and stuck at the correct angle. Be careful not to increase the dihedron, as there is a risk of Dutch roll is the pitch of the propeller is also too big (Dutch roll: oscillating movement of the wings during the rising of the engine).
Cut out a template (CTP 10x10 or aluminium 5x10), slice the ribs: in 20x10 hard balsa for the socket, in 15x10 average balsa for the rectangular part of the first dihedron, double rib for the dihedron fracture. For the trapezoid part of the wing extremities (second dihedron), ribs in soft 15x10 or average 10x10 balsa. Polish up the ribs and sand them all together, placing the outlines between the socket template and another template of 95mm of cord.

Personal hint
Take the marginal template of the stabilizer (100 mm cord with USA 5 profile) to sand the 12 ribs of the extremities; right and left. Then sand the identical ribs, two by two, to straighten out the edge of the ribs, which has come out a little oblique. Be careful when cutting of the notches of the leading edge 6x3. Then cut the rib tails which are to be fitted in the notches of the trailing edge. Take care to correctly do the fixing of the longeron 5x2 B.D. to the central parts and the fixing further back (by 2 mm) for the 4x2 B.D. of the dihedron extremities. The marginal edges are to be carried out in two thicknesses of 15x10 balsa, stuck together.
The building of the longeron, done before any assembling, makes it necessary to first build the rectangular part of the wings. Once this part is properly dry, build the end bit, supported on the frame, making sure that the rectangular part is properly blocked, parallel to the frame. When the canvas is drying it will be time to think of boring the negatives to the trailing edge. On the two socket ribs of each wing, correctly place and stick the two aluminium tube ends (diameter 1.5x2.5), taking into account the dihedron (place a 15x10 CAP, during the drying, and also the two nipples to the socket ribs so as to respect the same incidence on the two wings). Carefully check that all the brackets, attachments, tubes and nipples are properly stuck before going on to the red Japanese vellum, 12 g/m². Do all the sticking of wood with vinyl, and the rest, of metal, with cellulose.

Stabilizer and drifts
Building the stabilizer presents no difficulty: ribs in 15x10 soft balsa (or 10x10 average); longeron in 4x2 B.D. and the leading edge and rear edge in average, rather light, balsa. Mould of the central part in 8/10 after putting in place a mini-longeron in which are inserted and stuck the two attachments in CAP 5/10 (with cellulose). Take care to stick the two marginal

ribs a little skew (in 20/10 balsa) with a difference of 1 to 1.5 mm, acting as a right-hand curve.
Canvas with fine red Japanese vellum. Tension in water, then two coats of slightly diluted cellulose coating.
Only after complete building of the fuselage and the canvassed stabiliser will you stick the two cheek-pieces/flanges drawn on the plan. These must go in with a little play, between the two cheeks/webs of the fuselage, just in front of the abutment of the stabilizer (which must pivot on this abutment when dethermalising). Then stick the 4x3 stick which forms an angle, the joining-point of the two frameworks, the one in front (abutment of stabilizer raised on D.T.) and the light framework of the apparent prolongation of the fuselage on the stabilizer.
The small central cowling of the stabilizer is canvassed in fine black Japanese vellum, as if the fuselage continued above the stabilizer.
The drifts are cut in 12/10 balsa, sanded very finely. A coat of diluted coating, then canvas the two faces with fine black Japanese vellum. After tension obtained by vaporising water, apply two coats of very diluted coating. Leave these two drifts to dry perfectly between the pages of a dictionary for a week. The drifts are stuck on the marginal ribs of the stabilizer.
Tip: do not stick the rear 10 mm in case of correction of the curve. The central drift; stuck under the fuselage once this is completely finished and canvassed, is built in rather hard 30/10 balsa. If the balsa seems heavy, it can be hollowed by making some little holes (using a tube with a corrugated edge). Canvas with black paper and stick onto the fuselage with cellulose.

Building the propeller block
The building plan, full scale, gives all the details of the nose. Take care of the shape of the hook, shaped like a Z, to be properly centred in relation to the axle made of 20/10 CAP. Regulate the length of the axle according to the length of the nose, of the thrust ball-bearing and of the spring ensuring the stopping of the engine before full uncoiling.
The support of the blades, made in 15/10 CAP, must be bent carefully (angles to be respected in both directions, as well as the distance from the axle). Two little plates on the extremity of the axle, plus two little plates on the support of the blades, added to a little angle/elbow of the axle, just in front of the front ring, make it possible, after binding with 0.5 diameter copper wire, to be more sure that the soldering will hold properly, even when the engine is wound up.
Then solder the two spiral springs, in 5/10 CAP, which advantageously replace the recall elastics of the blades, at the end of uncoiling (patent R.J.). The blades are moulded on the block, cut according to the readings on the plan. They are made in three thicknesses of 10/10 balsa, thinned down on the trailing edge, and laminated with a slight crossing of texture grain.
Final sanding, then three coats of nitro coating after sticking the two 8/10 CTP reinforcements (front and rear) and sticking the tube and the folding abutment.

Final details
The landing gear is in 15/10 CAP, with a 12/10 soldered counter-support. Wheels made in sandwich balsa (CTP). Average aluminium tube. Black paint; Canvassing in Japanese vellum, 12 gr/m² (fuselage, and thicker if desired), black for the fuselage, drifts and nose, red for the wings and stabiliser. Registration MACP, in black paper stuck with coating under the wings.
Name : "LE VIBRANT", in white on the sides of the fuselage and the logo of the "Saint" running (which I adopted in 1948), painted on the drifts in white.
Do not forget to mount the guys in 0.5 diameter copper wire to keep the dihedron at 115 mm. Otherwise a large dihedron and too large a propeller pitch bring about a rolling movement in the engine.
Remedy : reduce the dihedron, or increase the size of the drifts slightly.