

The Bumblebee

A Sport Scale Model of a Czechoslovakian Crop Duster

By LADDIE MIKULASKO. . . In Czechoslovakian, "Cmelak" means Butterfly. Whatever you wish to call it, this sport scale model with operating duster is a pleaser. Power is a .60 two-stroke. Plans are available.

• As in any developed country, Czechoslovakia found itself in need of an efficient crop duster to serve its agricultural sector.

Since the first world war, Czechoslovakia has had a highly developed aircraft industry. It was just natural to come up with an indigenous design. The Cmelak became the most effective agricultural aircraft in use there.

This airplane, with its rugged looks, will not win any beauty contests, but the aim was to design a plane with good load-carrying capacity. The wing, with its large flaps and generous ailerons, allows it to operate in confined areas. The pilot has good protection and great visibility.

A relatively large number of these aircraft are flying in most Eastern European countries.

When I was looking for what to build next as a scale model, the Cmelak caught my eye. I decided to build it for several reasons; one was the crop-dusting capability, and another was the large wing and flaps. I felt that the Cmelak would be a stable flier as a model. It did indeed prove to be an excellent flying machine. The flaps are very effective, allowing the model to be brought down at a very steep angle. "Crop dusting" is an extra bonus in flying this model.

After the loss of the first model because of battery failure, I made a new set of plans, incorporating improvements in internal construction. Two new models were built from the new plans, incorporating improvements in internal construction. Two new models were built from the new plans. The model is 1:6.5 scale in outline. Because it is a sport scale model, some details were omitted. My model uses a .60 two-stroke engine, but I feel that a .60 to .90 four-stroke would be just as good.

CONSTRUCTION

The construction is only moderately complex. I will describe only the more important steps in building the model.

Start building the wings first. All wing construction is done over the plans. To make the construction easier, follow this sequence.

First, cut out all of the ribs.

Next, build up the complete spar for both left and right wings. These spars will be joined in the center later on.

To build the spars, pin 1/4 x 1/8 spruce top and bottom spars over the plan and glue in every second web as shown. Where the wing dihedral starts, glue in the 1/4 balsa dihedral joiner. Remove the completed, unjoined spars from the building board.

Inset all of the ribs into the openings in

the tapered part of the spars only. Each rib has to be touching the webbing on one side. Do not glue the ribs to the spar yet.

Cut out the trailing edge sheeting to the exact size and pin into place over the plan on the building board. Now, place the spar over the plan with a 3/32 shim under it. Line up all of the ribs with the plan and glue them to this bottom sheeting only. Glue the half-rib (W-1) to this spar as well.

Remove the pins from the trailing edge sheeting, but leave the spar and rib (W-1) pinned. Now, place the wash-out guide under rib (W-13). Shim the trailing edge sheeting so that it is straight from rib (W-1) to (W-13).

Only now should you glue all of the ribs to the spars and webbing.

Glue the leading edge strip and top trailing edge sheeting. Between ribs (W-6) and (W-7), install the aileron bellcrank.

Glue on the top leading edge sheeting. Remove the partially-completed wing half from the building board and assemble the other half the same way.

Take the two wing halves, line up the spars, and join them in the middle with the 1/4-inch balsa insert.

Glue all of the (W-2) ribs to the spar and then add on the bottom trailing edge sheeting to the center section of the wing.

Glue 1/16th plywood doublers to ribs (W-1) and (W-2), which are going to hold the landing gear block.

Install the controls for flaps and the nyrod to control the aileron bellcrank.

Glue the center section leading edge strip to all (W-2) ribs.

Glue in the four 1 x 1-inch balsa or hardwood blocks as shown on the plan. These are the supports for the wing bolts.

Glue on all top sheeting for the center portion of the wing.

Remove the wing from the building board and glue in the landing gear blocks, followed by the bottom leading edge and center section sheeting.

Cap the leading edge with 1/8-inch balsa strip. Cap all of the ribs on top and bottom.

Now, on the top and bottom trailing edge sheeting, mark the separation lines for the ailerons and flaps. Cut the sheeting on these lines and remove it, exposing the ribs. Cut all of the ribs off with a razor saw, flush with the sheeting. Once this is done, close the trailing edge of the wing with 1/4 balsa strip and glue on the 1/2-inch balsa leading edge to the flaps and ailerons.

In each of the flaps and ailerons, cut out an opening in the bottom and glue in the 1/4-inch plywood support for attaching

control horns.

Glue together the bin for holding the powder for "crop dusting." Cut a hole in the center section of the wing and glue this bin into place, as shown on the plan.

Sand the whole of the wing to your satisfaction.

Temporarily install servos for ailerons and flaps. Connect all of the linkages and check operation of the controls to your satisfaction.

On top of the bin, install and connect the servo to the gate for release of the powder. Adjust the servo arm so that when the gate is closed, the servo arm is in the vertical position. This way, there is no drain on the receiver battery with a hopper full of powder.

When satisfied with the operation of all of the controls, put the wing aside.

NOTE: Using the gate to release the powder in flight is not "scale." The full-size airplane uses a rotary spreader for powder and a spray bar hanging behind the trailing edge for liquids.

LANDING GEAR

Now, make the landing gear. Cut 7/16-inch brass tubing to the correct length and solder two attaching points for the two dummy landing struts. At both ends, insert a 1-inch long dowel with a 3/16ths hole drilled through the center. Now, slip this tube over 3/16ths piano wire. Bend the wire to the shape shown on the drawing in a vise. Position the brass tubing in the proper spot on the leg and secure it with cyanoacrylate glue.

Make mudguards for the wheels out of copper or fiberglass. To hold the guards over the tires, 1/16-inch piano wire is bent and attached to the guards and then silver-soldered to the wheel collars.

The landing gear struts are non-functional. You can make them out of flexible materials (eg. inner Nyrod tube).

FUSELAGE

Start by gluing together left and right side frames, using 1/4 x 1/4 spruce for longerons and 1/4 x 1/4 balsa for the diagonal braces. At the front, glue in two 1/8-inch balsa fillers for each side; one with the grain running vertically and one with it horizontal. On the inside, glue on a 1/32-inch plywood doubler.

At the rear, glue in two balsa doublers to support former (F-12).

Cut out all of the formers. Mount the nylon block for the steerable tailwheel assembly to former (F-12).

Now, start assembling the fuselage upside-down by gluing in formers (F-4), (F-12) and (F-14) between the fuselage sides. Glue in all of the 1/4 x 1/4 balsa cross

braces between the fuselage sides.

When all of the glue is dry, pull the fuselage sides together and glue in all of the forward formers. Glue in the 1/8th balsa cockpit floor.

Now, remove the fuselage from the building board.

On top of the fuselage, glue in all of the half-formers and stringers. At the rear, glue on the stabilizer saddle and tail cone.

Plank the top of the fuselage between (F-1) and (F-2) as well as the roof if the cockpit. On the outside of the fuselage sides, glue on soft 1/4-inch balsa sheeting from (F2) forward. This will be sanded to contour later.

Glue on the outside stringers behind (F2).

On the inside of the fuselage, glue in the hardwood blocks for the wing bolts.

Now, the last thing to do is to sand the entire fuselage.

Place the fuselage on the wing and make the fillets out of balsa or your favorite material. Mount the steerable tailwheel and rudder horn.

Before you glue in the windshield, paint the inside of the cockpit silver and mount the pilot's bust and the instrument panel. Then glue on the windshield and side windows.

TAIL SURFACES

For the stabilizer, cut out all of the ribs, and the leading and trailing edges. Draw the center line on all pieces, so that it will be easier to line everything up.

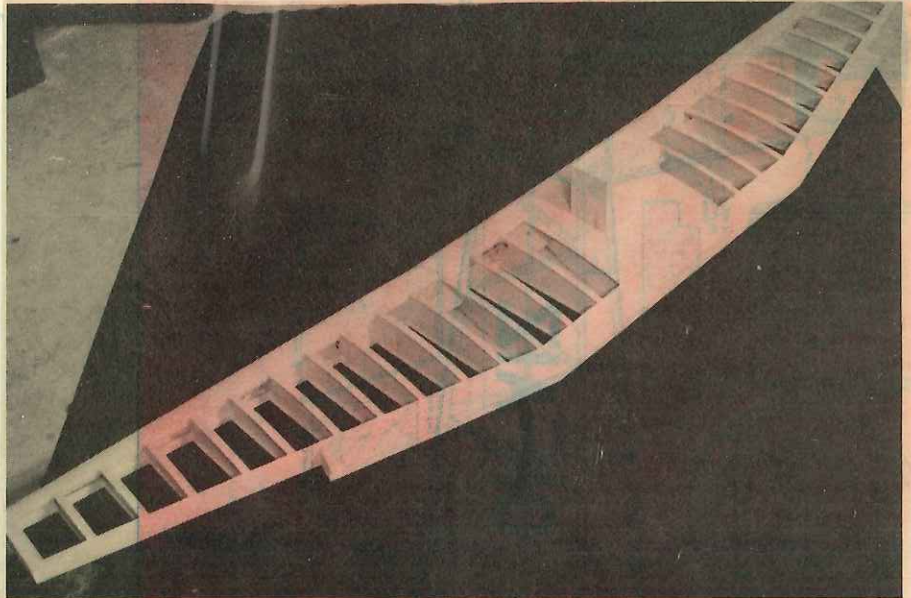
Block up the root and tip ribs so that their center lines are parallel to the building board. Glue the leading and trailing edges to them. Now, fill in the remaining ribs, gluing them in place.

Sheet the top and bottom with 1/16th balsa. Glue on the leading edge cap strip and the tip blocks. Sand the stabilizer to suit and then build the fin, rudder and elevator in similar fashion.

Glue the stabilizer and fin to the fuselage.

To finish up, the cowl must be built next.

The front of the cowl is built first. Cut out two plywood rings and glue 5/8-inch balsa block to them, trimming the balsa so that you have two donut-shaped rings. Line the large ring on the inside and the small ring on the outside, with 1/32nd



The completed wing of the Cmelak (Butterfly) ready for covering plywood.

Now, take 1/32nd plywood and, with a compass, draw two circles; one the INSIDE diameter of the large ring and one the OUTSIDE diameter of the small ring, with the small circle inside the large.

From the center, divide the circle into a number of segments needed to make the front cooling shutters (see front-view of cowl).

Cut out all of the segments. Now, place the small ring in the center of the large ring. Glue all of the shutter segments between them at the same angle with cyano glue. When finished, flip this assembly on its back. Take a new piece of 1/32nd plywood and cut out one large and one small ring to be glued to the face of the cowl to hide the shutter glue joints (again, see front view).

Cut out the rear cowl former. Jig the front and rear cowl formers the correct distance apart and epoxy the outer plywood skin to them.

Now, depending on your choice of engine, the firewall can be glued to former (F-1) at such distance that your engine hub clears the front face of the cowl by 1/4 inch. Sand and mount the cowl to the fuselage.

Cover and paint the model with your fa-

vorite materials.

The color scheme on my model is the same as the full-scale aircraft which are allowed to operate in border areas of the country. It is an easy color to see in the air.

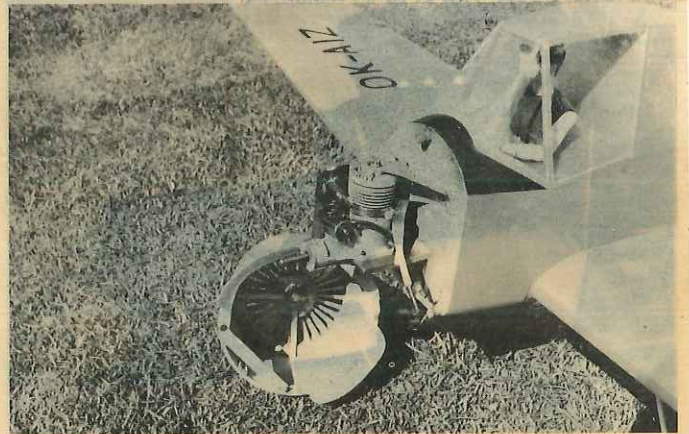
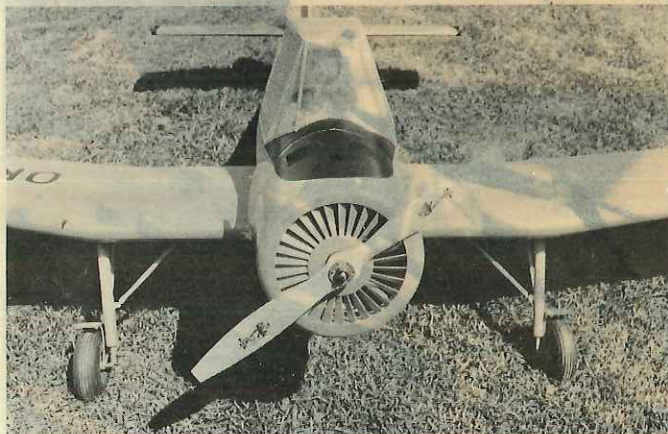
Install the radio, engine, fuel tank etc., and check the center of gravity. Some ballast will likely be required to balance the model.

FLYING

The model is easy to fly for anyone acquainted with low-wing aircraft. Cmelak will do all of the basic maneuvers including spins.

On takeoff, the tail will come up almost immediately, but let the ship roll for quite a while at full throttle before feeding in any up elevator. On your first takeoff, do not use any flap. Once you are familiar with the model's handling, start exploring flying it with flaps. By lowering them more and more, the model will be able to fly at slower and slower speed until finally, at the maximum 45-degree deflection, at reduced power, you will be able to come in at a very steep angle without picking up much forward speed. The flare in this mode is incredibly short.

That's about all I have to say about this interesting aircraft. I hope that you will have many happy hours flying this Czechoslovakian cropduster.



For the Cmelak model, the engine is mounted on a 1/4-inch thick steel angle iron which is used in place of lead ballast. Behind the engine head is aluminum deflection plate to divert hot air away faster. Engine has a homemade muffler.