

Minifox, maxi fun!

The Eurofly Minifox is an inexpensive single-seat aircraft that puts the pleasure back into flying – What's not to like?

Words Dave Unwin Photos Keith Wilson

"How did those look Keith?" I ask. "Did you get enough takeoff and landing pics?" "Absolutely" he grins, "got some crackers!" "Oh, OK," I reply, "well, I'll just do a couple more circuits, to be on the safe side." I knew we had all the pictures, and also knew that Keith knew that I knew. Bottom line: I was having a blast and just wanted to keep flying! The Minifox is a lot of pure flying fun, and in an era when we're surrounded by 'fun sponges' (as my young sons call them) that

just want to soak up all the joy, it was pure joy to spend an agreeable autumn afternoon on a well-tended grass strip shooting a succession of touch-and-goes in an open-cockpit single-seater.

I first saw the Eurofly Minifox at last year's LAA Rally and, being an impecunious aviator who was already convinced there was nothing new there in my price range, I was instantly intrigued when Dave Broom of Airplay (the UK agent for Eurofly ULM) told me that it could be "completed for less than nineteen grand". That's not a lot of money for a brand new

flying machine, and it occurred to both Editor Philip and me that, just like the Spacek SD-1 (see *Pilot* December 2017), the new SDR category might reverse the current trend of making aviation ever more expensive. For more expensive it surely is. In 1967, a new Cessna 172 cost around \$12,750, and a Dodge Charger about \$3,100. These days a top-of-the-range Charger is \$52,000, but a Skyhawk SP is \$307,000! Anyway, a flight test was rapidly arranged and photographer Keith and I met Dave on a very pleasant autumn day at Airplay's Sutton Meadows base. ➔



Flight Test | Eurofly Minifox

The basic design is based on Eurofly's Firefox two-seater and is almost a 'pod and boom', but without the pod! The tubular boom is made from 6082T2 alloy, the open chromoly steel spaceframe being powder coated grey for corrosion protection. All the fixtures and fittings (even down to the nuts and bolts) appeared to be 'aviation spec' and this isn't always the case with SDR aircraft. The high wing is strut-braced and covered with semi-translucent Polyant PX5 trilaminate sailcloth. This modern synthetic material is very robust and UV-resistant. To brighten up the wing and tail unit (the primary colour is a rather anonymous translucent grey) the sailcloth can be ordered with highlights in blue, green, orange, red, or yellow.

Dave had already rigged the Minifox before we arrived, but he assured me that it's an easy one-man rig, as it's very light and straightforward. Eurofly now also offers the New Closing Wing System (NCWS). This arrangement incorporates brackets that simplify alignment of the wing with the attachment points, and replaces the stock wing attachment bolts with quick-release pip-pins. The NCWS allows the wings to fold aft and rest on the tailplane in the wing supports provided. With wings folded the aircraft is only 2.3m wide, allowing it to fit into a shipping container or easily tuck into the corner of a shed.

As you might expect, there are several engine options. The test aircraft was powered by the engine that Airplay recommends, a Cisco Motors 250 BullMax. This 230cc single-cylinder, two-stroke engine produces 33hp at 7,400rpm, yet only weighs a very impressive 16.5kg, complete with the optional electric starter. It turns a two-blade composite Helix prop in a pusher configuration, via a Poly Vee-belt with a reduction drive ratio of 2.62:1, and is fed from a single fifteen-litre fuel tank behind the seat.

While the engine's tuned exhaust has such sinuous curves it is practically a sculpture, the main undercarriage legs



Above: proper aeroplane features include an elevator trimmer



Below: further good design – the ailerons are operated by rods and torque tubes

look a little flimsy, but Dave explained that they're a lot more robust than they look, as they're made from 7075T6 Ergal, which is an extremely strong alloy. The undercarriage consists of three plastic wheels of the same size, each fitted with a solid tyre, plus a little 'bumper' wheel underneath the fin. There are small cable-actuated drum brakes on the main wheels. The fin, rudder, strut-braced tailplane and elevators are made using the same techniques and materials as the wing. There is a large trim tab in the starboard elevator, which is actuated by a combination of a cable and a large spring. It all appeared very nicely made, and I particularly liked the size of the control surfaces. It looked like there'd be no lack of control authority. Pushrods drive the ailerons and elevator, with cables for the rudder.

By now I was eager to get airborne, and the Minifox looked like it felt the same way. This is because when there's no-one



The Minifox seems to be looking impatiently up at the sky...

in the cockpit it rests on that bumper wheel beneath the fin, so it seems to be looking impatiently up at the sky. After a quick but comprehensive briefing from Dave, I don silk scarf and leather helmet, then carefully climb aboard and the Minifox nods onto its nosewheel. The cockpit is as simple and unfussy as the rest of the aircraft. There is no adjustment for either the pedals or seat (except cushions), but luckily it fits me fine. The test aircraft has the optional fibreglass nosecone, which is fitted with a small Lexan windscreen. The nosecone is available in either black, blue or red to match the seat material. Another option (not realised on the test aircraft) is a Comelli pneumatic BRS.

Once I've strapped it on (well, that's what it feels like – the whole airframe is not that much heavier than me), Dave



"Mind yer 'ed!" Unwin keeps out of the way while UK agent Dave Broom gives the recoil starter a good tug



Rigging and de-rigging the NCWS Minifox is a simple one-person job and, wings-folded, the aircraft is only 2.3m wide, tucking easily into the corner of a shed



Leather helmet and gloves are *de rigueur* when flying an open-frame aircraft like the Minifox

reminds me that there aren't yet control stops on the stick, and confirms that I have enough fuel for about two hours of playtime.

Unsurprisingly, the controls and instruments are simplicity personified. The stick carries a bicycle-type lever for the cable-operated brakes, which can be held on with a lock button. There is no differential braking, but the nosewheel steers through the rudder pedals. There's a throttle on the left, the elevator trimmer on the right – and that's all you need! The panel continues the minimalist theme and consists of an air speed indicator (ASI), a small altimeter, digital tachometer, analogue cylinder head temperature (CHT) and exhaust gas temperature gauges and a slip ball. The ASI looks a little optimistic (almost half of the scale is effectively redundant), and the non-sensitive altimeter is not easy to interpret. I suspect it is possibly a mountaineering one, as it only has a single pointer. As for the electrics, there's a switch for the single magneto (the red button under the seat is for the optional electric starter).

Dave obligingly gives the recoil starter a hearty tug and the little engine buzzes busily into life. It is possible to do it solo when seated, although if you're by yourself it's probably easier to set the park brake and chocks, start it then jump in. As it's a pusher you're well clear of the prop the whole time.

During the short taxi to Runway 28 I discover that the nosewheel steering works well and that the brakes are only really needed for starting and the run-up.

I quickly complete my generic single engine piston 'flow check' and, while waiting for the CHT to register, feel vaguely uneasy that I've missed something. As the BullMax 250 is a two-stroke, there aren't even oil temperature or oil pressure gauges to check, and the small 'Master Caution' light in my brain flickers once or twice, so I wait until the CHT does register then run through the pre-takeoff checks again.

Having convinced myself I haven't forgotten anything, it's time to fly. Ambient conditions are close to ISA, with the 8-10kt breeze more or less straight down the runway. Like most two-strokes the engine has quite a narrow power band, and as I type this sentence it occurs to me that there's probably an entire generation of *Pilot* readers that have never ridden a powerful Japanese two-stroke motorcycle such as Kawasaki's legendary H2 Mach IV 750cc triple (aka The Widowmaker), and consequently have no concept of power bands, tuned exhausts and expansion chambers! Unlike four-stroke engines, which typically have relatively linear power/torque curves, two-strokes are much more 'peaky'. The BullMax's exhaust is carefully shaped for tuning. The wide part of the pipe is the expansion chamber, and the length and varying diameter of the pipe 'downstream' of the expansion chamber has a profound effect on where the sweet spot is. Consequently, as you open the throttle on a two-stroke, initially there's more noise than thrust, then the rpm reaches the 'power band' and the engine's urge becomes a lot more urgent. In fact, once the engine 'comes on the pipe' the acceleration is really quite good, and with just a hint of backpressure on the stick the Minifox is airborne after a very short ground roll. However, although it will fly in ground effect at very slow speed it has almost no energy, either potential or kinetic, so I check forward on the stick and hold it down until the ASI shows 55kt, then initiate a shallow climb. Like all high drag/low inertia machines you don't want to get on the wrong side of the drag curve, and although altitude may



Takeoffs and landings are easy, but remember that lightweight/high drag aircraft can bleed energy very rapidly

be money in the bank, speed is money in your pocket!

While Dave and Keith strap themselves into a GT450 flexwing I shoot a series of touch-and-goes, and this is just as much fun as you'd imagine. I really like flying circuits at quiet, uncontrolled grass fields on a sunny day, and the Minifox is already starting to work its charm on me. In a world of GPS, ADS-B and 8.33 radios, the Minifox is a real throwback to almost the dawn of powered flight. And as Cecil Lewis explained in the foreword to his seminal memoir *Sagittarius Rising*, 'what captain of a transport aircraft, hedged in with corridors, courses and controls, does not long to send them all to the devil, vault into the cockpit, flip a switch and take off, bareheaded, into the wind?' I'd like to think, still more than a few!

The GT450 is soon airborne and I move into formation. During the preflight briefing Keith and I had already agreed that this shoot was probably going to be a bit tricky – and our concerns prove well justified. The handheld transceiver tucked into my jacket neither transmits nor receives and there is quite a speed mis-match between the two aircraft. Furthermore, on a flexwing microlight the pod acts a bit like a pendulum (which

doesn't make it a very stable camera platform) and I can see the visor on Keith's helmet won't stay up. I would feel sorry for the long-suffering lens man – but on this occasion I'm saving my sympathy for myself! I really don't have a lot of speed to play with, and at times I'm not sure if Keith is using hand signals or trying to hold his visor up. It's not easy, but we persevere and get the job done, although I'm grateful when he kisses me off and I can break out of formation.

For the purposes of completeness, I return to the generic *Pilot* flight test card and examine the stick-free stability, climb and cruise performance, slow flight characteristics and stall traits. However, to be honest, the limited instrumentation makes completing some tasks on the card quite tricky – and anyway this really isn't that sort of aircraft. It's a fun flying machine, and assessing the qualitative and quantitative characteristics, stick force per G and roll-rate – while interesting – isn't necessarily *fun*.

Anyway, if you are interested, the Minifox is positively stable around all three axes, and the generously proportioned primary flight controls provide excellent control authority, being both powerful and well-harmonised. ☑



With such exposure, the four-point harness is welcome



Clever: the rudder pedals are interconnected and the nosewheel steered by a common bellcrank



Some of the basic instruments are better than others...



Wheel brakes are operated by a lever on the stick

ELECTRIC DREAMS

I really was taken with the Minifox, and would love an electrically-powered one with a feathering prop. On a good soaring day it would be an absolute hoot, as the slow speed and tiny turn radius mean you could really centre in the core of a thermal: imagine taking something a bit like a Slingsby Grasshopper cross-country, but

without the very real possibility of landing out! Or, alternatively, trawling it to some hills or cliffs, bunting the local farmer a fiver to take off from one of his fields, and then going ridge soaring. Excited by the prospect I did some digging around on the internet and soon found a very advanced brushless electric motor that only weighs

7.3kg and is capable of producing 22kW for takeoff, and 20kW continuously. Sadly, however, the energy density of the batteries still lags far behind fossil fuels, for where 11kg of petrol will fuel the BullMax for about three hours, even 150kg of the very latest Lithium-Polymer batteries provide barely an hour at 20kW. One day....

The roll rate is acceptably brisk, especially if you help it along with judicious application of the powerful rudder, while the field of view is – as you’d imagine – exceptional. It’s a real magic carpet ride.

Evaluating the climb rate is not so easy: there’s no VSI, the single-pointer altimeter has very poor scale expansion, and I have to use my trusty Timex’s stopwatch facility which is half-hidden by my glove. My best guesstimate is that climbing from 1,000 to 2,000 feet was achieved at something between 400 and 500fpm (65hp Cub figures – Ed). The stall characteristics are very benign and slow flight is – as you would expect – ridiculously slow:

somewhere around 22kt. This really is a machine that can just barely kill you (*That’s enough Cub references – Ed*).

At the other end of the speed scale the ASI eventually settled on 60kt for a true airspeed of 64. However, the engine does sound a little frenetic at this speed as it’s turning at around 7,400 rpm, and a more practical cruise speed is 50-55kt at 6,500rpm. At this speed the motor is burning around five litres an hour, with gives a theoretical still air range of about 125nm with thirty minutes reserve. It should be borne in mind, though, that if you’re into any sort of a headwind those thirty minutes won’t get you very far,

although on the other hand practically any open area with a reasonable surface could be viewed as a potential runway.

With the flight test card complete I return to Sutton Meadows for some fun. In a similar way to soaring, the physics and poetry of flight completely combine in the circuit, and even after thirty-odd years of flying the simple satisfaction of concluding a well-judged circuit and finely flown approach with a satisfyingly smooth landing continues to exercise a fascination that is hard to explain and difficult to resist. And an open cockpit and grass runway just enhance the sensation, and sense of satisfaction when you get it right.

The roll rate is acceptably brisk, especially... with judicious application of the powerful rudder



SPECIFICATION

EUROFLY MINIFOX
Price as tested (RTF) £20,964 including UK VAT and delivery. Complete kit including engine from £18,799.20

DIMENSIONS

Length	6.10m
Height	1.8m
Wingspan	8.65m
Wing Area	10.06sq m

WEIGHTS AND LOADINGS

Empty weight	115kg
Max AUW	230kg
Useful load	115kg
Wing loading	22.86kg/sq m
Power loading	9.34kg/kW
Fuel capacity	15 lit

PERFORMANCE

Vne	70kt
Cruise	55kt
Stall	22kt
Climb rate	500fpm
Best Glide	11:1 @ 30kt
Min Sink	400fpm @ 37kt
Takeoff to 50ft	180m
Land over 50ft	120m

ENGINE AND PROPELLER

Cisco 250 BullMax single-cylinder air-cooled two-stroke, producing 33hp (24.6kW) at 7,800rpm and turning a Helix two-blade fixed pitch pusher propeller via a Poly V belt with a reduction drive ratio of 2.62:1

MANUFACTURER

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Landing is easy, although always remember that lightweight/high-drag aircraft have very little inertia and tend to bleed energy very rapidly. Forget Vs x 1.3 or even 1.5: Vs x 2.0 is entirely appropriate for the Minifox, even if it’s flat calm, so I come scorching in at a heady 55kt. One thing’s for sure, in low-inertia machines like this you’re never going to overshoot. I can see Keith snapping away from the side of the runway and, on the grounds that you can never have enough pictures, I keep going round and around and around, until the urge for a coffee break becomes too insistent.

Once back on the ground and thawing out we debrief the flight, and then Dave explains the various options available. The Minifox can be had as a complete quick-build kit requiring around fifty hours to complete, or as an RTF (ready-to-fly) aircraft. Dave claims that the kit requires no specialist skills and can be completed inside a week, and I have to say this seems perfectly reasonable.

At that point, Dave’s next student turns up, and he apologetically excuses himself with a “have another go if you want to”. After a reviving drink, Keith shoots the detail pictures, and we sit outside in the sunshine. It is a glorious autumn day, and the Minifox is just sitting there, with its nose pointing expectantly at the perfect sky. It really does seem such a waste for it to be on the ground, and Dave did say that I could have another go if I wanted to... “Hey Keith, come and give the starter a pull would you!”