

## Fly Synthesis Storch HSJ



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**This month we have another Italian aeroplane that in this case is actually a three-axis ultralight. It has all the anticipated Italian benefits of delightful handling, great performance and brilliant external visibility, and just abounds with neat little design touches, although I felt its looks tended towards the ‘cute’ rather than the ‘beautiful’.**

I was introduced to it by an old friend, Ed Smith of Howatharra Aviation who, as well as using his wife Gwyn’s Storch for training in his flying school, has become the Western Australian dealer for the whole Fly Synthesis family. Since it was time for my biennial ultralight flight review, I was flying with Ed’s CFI, and another old friend, Stewart Maddigan, attempting to combine my AFR with a formal type air test. Since the syllabus for both are very similar, this shouldn’t be too much of a problem, and might actually be quite fun.

Fly Synthesis is a comparatively young company (actually, 22 years old) based at Mortegliano near Udine in northeastern Italy (northeast of Venice). It produces several models including, as well as the Storch family, the all composite, low wing, side-by-side two-seat Texan, and the neat little Rotax 503 engined Wallaby single-seat high wing ultralight. The Storch wings also form the basis of

the Flight Team/Pipistrel Sinus German and Slovakian three-axis ultralights. Fly Synthesis is thriving, having spent the past two years building a new 4000m<sup>2</sup> factory with its own 2000m long airstrip. Fly Synthesis Australia has already imported over 25 aircraft into the country, and more than 400 Storchs have been sold worldwide. From now on, the company expects to produce at least two complete airframes every week.

There are several Storch versions, including Australian approved kit-built ones that are already painted and substantially finished, to be assembled quickly (in perhaps a single month of full time working). The example I flew was the factory built HSJ (High Speed Jabiru). The CL De Luxe is the standard version, powered by a 64hp (48kW) two-stroke Rotax 582 engine. The HS De Luxe has the same motor, but clipped wings and a shorter body, while the SS De Luxe has an even shorter wing and fuselage length and a four-stroke Rotax 912 engine. The long winged version is also available on floats.

This Storch HS has the 8.71 metre, intermediate span wing, an 85hp (65kW) four-cylinder Jabiru 2200 engine, and a maximum takeoff weight of 450kg. Its very useful 240kg empty weight enables it to lift the full 60 litres of fuel plus two 83 kilo blokes – no mean feat for an aeroplane stressed to +4 and –2g limits.

Its low weight combined with high aerodynamic efficiency gives the Storch remarkable performance with modest fuel consumption,



but its excellent controls can only be the result of a sound knowledge of aerodynamic theory and presumably painstaking development. I could not sum up its handling better than the summary on the maker's website, which among some rather quaint Italian/English translations says, "...the aircraft is very easy to fly with a optimum control at low speed..."

The strut braced wings are each constructed of a pair of thin glassfibre/foam sandwiches, formed around two strong laminated glassfibre spars into a laminar flow aerofoil with utterly smooth skins and not a single surface blemish. Each inboard section holds a 30 litre fuel tank that can easily be removed after undoing a couple of bolts in the wing root.

One of the Storch's many neat innovations is the refuelling system, which incorporates an on board pump and an external tap and filter with a short length of pipe just ahead of the right main gear leg. Stand a fuel can under this, attach a length of tubing, switch on the pump and go and have a cup of tea. When you get back, the can is empty and the tank is full – there is no lifting, splashing or dripping here!

The entire trailing edge supports full span Junkers type ailerons hung on six hinges per side, and suspended separately behind and below the wing like a Kitfox's or Skyfox's, but with a pair of prominent forward-reaching mass balances on either side. Like the Kitfox's these flapperons droop when flap is selected, but unlike that rather less well developed aeroplane, these work really well as ailerons whatever the flap deflection.

The Storch can be ordered with a folding wing option, which, although a tiny bit heavier, is both ingenious and handy for winter storage. The short exterior fuel lines by the trailing edges are flexible, so they do not have to be detached. The flapperons are disconnected by slipping out a safety ring and withdrawing a pin in the root linkage, which then slides inboard, disengaging from the flapperons. Three wing root spar pins (two at the top, and one on the bottom) are also removed, and then the operator goes out to the wing tip, where a small ring (normally taped in place) is pulled. This activates a long cable, which disengages a claw-like pawl at the root, allowing the wing to be slid outboard a couple of inches. Rotating it trailing edge up, the operator then walks the tip to the aeroplane's tail, where it is clipped into position for security. This whole process is far easier than it sounds, and takes a single person just a couple of minutes on each side.

The body is a sturdy welded chrome molybdenum steel tube cage which is clad in a thin, smooth and lightweight fibreglass non structural skin with an elegant afterbody shape which presumably gives good pressure recovery for minimal drag. The single lift struts and main landing gear legs attach to a strong



under-floor carry-through member. These legs are simple thick, forty centimetre tapered rods of ergal (an aluminium alloy with a high modulus of elasticity) which cost just €70 (A\$115) per pair. They can be unbolted and replaced in an hour or so – a very sensible feature for a training aeroplane. Each wheel is enclosed in a neat, low drag spat, and both the nose leg and the mains have aerofoil cross section fairings.

A broad aluminium tube acts as the rear fuselage and carries the tail, with a fibreglass fin and rudder of generous area and an all-flying tailplane or stabilator constructed similarly to the wings, with another pair of mass balances and a full width anti-servo tab which can be manually trimmed to relieve elevator loads. The engine is neatly cowled as Jabirus always are, but in this case in ultra-light carbonfibre, and driving a GT Tonni wood and composite propeller.

The doors are wide and high, made of tinted Lexan, bulged outwards for more than enough shoulder room, and hinged along the top, to lift up and clip under the wings with the sort of pop studs used on the tonneaus of classic British sports cars. I have to admit that, on the windy days I flew, they kept flapping down again in the stronger gusts (although they don't hurt, because they don't weigh anything). There are three simple rod latches, operated by twisting a single, central knob through 90 degrees.

Entry is dead simple. You just turn around and sit over the sill on to the seat, then swing your legs up and forwards into the footwell. Each seat has four fore and aft positions, spanning perhaps 10cm, and easy adjustment by popping out a pin, sliding them to the required position and then pushing the pin back into place. The cockpit is very roomy, with lots of headroom and plenty of shoulder space, being a whopping 1.12m wide. Behind the seats is a fairly generous, but rather oddly shaped baggage area, which will carry up to 12kg of evenly distributed stuff.

The seats are effectively on the floor, so your legs stretch straight out in front of you, but the position is actually quite comfortable. The seats offer good lumbar support despite rather thin padding, with fixed four-point harnesses.

Each wheel is enclosed in a neat, low drag spat while all gear legs have aerofoil cross section fairings.

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The Storch's simple and thick main landing gear legs can be unbolted and replaced in an hour or so – a very sensible feature for a training aeroplane.

Each occupant has a curvaceous control column with quite a long travel, remarkably low static friction and comfortable foam grips. The rudder pedals are simple steel tube fabrications, which operate the rudder through dual push-pull Teleflex cables and also steer the nosewheel through a direct linkage. The cockpit transparencies are enormous, and visibility is better even than in some helicopters.

The instruments occupy an extremely neat and visually elegant, helicopter-like central binnacle which is mounted low, to be completely out of the way of your forward sight line. Across the middle are the ASI, VSI, altimeter and tachometer, with engine gauges below, and the slip ball at the very bottom, while the intercom and radios (a Microair VHF and Mode C transponder) run above them with the compass on the very top. A hand-held GPS is bolted externally on the binnacle's far right (presumably so that the instructor can check your navigation without your cheating from it), and there is a pair of very useful zippered stowage bags on the floor against the outboard sidewalls.

On a vertical extension below this binnacle are the carburettor and cabin heat knobs, magneto and master switches and starter button with, below them, sideways rocker switches and fuses for the various electrical services (including that refuelling pump). Behind this and between your knees are two small quadrants in tandem. The front one holds the lightweight plastic throttle and

smaller choke lever, while the rear one carries a pair of similar but intermediate sized plastic brake levers. There is no parking brake lock; the quadrant's adjustable friction holds these levers sufficiently firmly to prevent the aeroplane moving forwards until significant power is applied. Aft of the brakes are two separate fuel cocks, one for each tank, and the fuel quantity is read from three transparent windows in the wing root tanks.

Behind and between the pilots' heads, the flap lever protrudes forward from

The seats offer good lumbar support despite rather thin padding, with fixed four-point harnesses.



the rear bulkhead. Its latch is released by pulling forward on either of a pair of big triggers half way along it, and there are three flap positions: 'up', '15' and '30'. Since the headset jack plugs are immediately above it, this lever makes a handy place to hang the headsets on the ground when it is set to the mid position. In front of this is the tail trim lever, which hangs down from the wholly transparent roof and is set so its forward edge is vertical for takeoff.

Starting is standard Jabiru, although many people still do not seem to understand how to use the choke properly when the engine is cold. Even with the throttle fully closed, this eager little aeroplane soon moves forward under idle power. The nosewheel steering is very light and the turning circle is surprisingly tight.

Considering it is just a pair of short aluminium rods, the undercarriage is surprisingly soft and comfortable. Although unusual, the brakes actually work very well, and it is easy to apply them gently either together or one at a time to further tighten the already small turning radius. Held firmly, they comfortably hold the Storch against run-up power.

Pre-takeoff checks are simple and quickly accomplished, partly thanks to a typed checklist Ed and Stewart have attached to the overhead cross-cockpit tubing. Takeoff is normally made without flaps, although the first setting (15 degrees) is recommended when flying from grass, soft ground or in calm conditions.

The first day I flew, the wind was along the runway at 10kt and the temperature was a warm 30 degrees Celsius. With two big guys aboard, we limited our fuel to 45 litres to stay below the maximum weight (but that is still enough for nearly four hours' flying). Stewart showed me how resting my wrist on the brake levers served the dual purposes of supporting it while I operated the throttle and ensuring the brakes were definitely fully off for takeoff and landing.

But now, before I actually apply power, I have to make something of an admission. You see, I was far from being the first person to fly this lovely little aeroplane, which has been used for training at our local airfield for many months now. Everybody I had spoken to praised it as being lovely to fly, but in my arrogance I treated their opinions with disdain, for they were mostly first-timers or low hours pilots, so what could they possibly know about these things?

Well, I have to say right away that I was wrong and they were right. This is possibly the nicest two-seat aeroplane I have ever flown. I'll say that again. I know of few aeroplanes of any size that have such good climb and gliding performance, such light and effective controls or such excellent all-around visibility. And yet, despite its nimbleness, the Storch was never skittish, even in bumpy weather. On my first acquaintance, I wrote along the bottom of my test pad: 'Delightful! Why can't they all be like this?'

And then, as is the way of my strange life, I went off and flew half a dozen other aeroplanes, for a bunch of different magazines, including jets, turbines, aerobatic types and a couple more ultralights, before actually sitting down to write this article. Reading my notes, written three weeks previously, I felt I must have been mistaken, so I asked Ed politely if I might have another go. He sent me off for 20 minutes solo one afternoon, and everything came flooding back straight away. My notes were no exaggeration, this really is a delightful little aeroplane – and divested of an 85 kilo occupant, it goes even better than I remembered. Now, how can I wangle another 20 minutes in it?

Open the throttle with two aboard and the Storch simply zooms forwards. You need just a squeeze of right rudder to stay straight, but not for long, because she is airborne so quickly – like in maybe 100 metres at little more than 40kt. Solo, and in anything of a headwind, the ground run is nearer 50m, and over before you can think about it. The climb rate at full weight is nearly 1000ft/min, and significantly more than that just one-up. Off a 1200m runway, you can expect to be level at a thousand feet before you get to the far end!

The published airspeed for the best rate of climb is 59kt, while the best climb angle speed is 43kt, but for most purposes 60kt is more than adequate. Neither cooling nor forward visibility are a problem; it is just that 60 is an easier number to remember. At that speed, and at maximum weight on our hot, bumpy first day, I timed our climb from 400 to 1400ft at 700ft/min.

The flying controls are lovely – light, almost dainty, while being very effective and well harmonised. In fact, the controls are so light it is difficult to judge which axis is heavier and which lighter, they are all so similar. Just a little rudder pressure is needed to balance turns, which is ideal in my view. And despite its responsive-



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ness, it is not at all skittish, and stable in all axes. Pitch stability is very positive, but not so much as to hamper its controllability. It is less stable in yaw, partly because of some slight friction in the system, which probably comes from the nosewheel rather than the rudder. In roll, it is again stable, but only just, which is quite normal.

The full span flapperons give the Storch a good roll rate for its span

and square wing tips, and the visibility through those big roof panels becomes invaluable in tight turns. Circling at 80kt and 60 degrees of bank, the view is exemplary in all directions. This would be a great observation platform, and probably a very useful mustering aeroplane, too.

What is particularly odd (and very special) is that, with these very light and really effective controls, there is no sense of 'twitchiness' – quite the opposite in fact. The Storch quickly imbues a sense of confidence, and I am not surprised folk are tending to go solo in this little aeroplane rather more quickly than in some other types. Even in turbulence, and despite its very light weight and low wing loading, the Storch is bounced about much less than many other ultralights I have flown.

It is no slouch in the cruise either. Leaving the throttle wide open at 4500ft, we saw 102kt IAS (107kt TAS) at 3200rpm, 96kt at 3000rpm and 77kt at a rather quieter 2600rpm. Jabiru itself quotes a 15 litre per hour fuel consumption at 75 per cent power for this engine, but Ed assured me Howatharra Aviation is burning an average of less than 10 litres per hour during training, and this particular Storch used just 12 litres per hour at a steady 100kt on its ferry flight to Perth from the Eastern states.

Slowing right down, the controls could not become much lighter, and were still effective right down to the 40kt stall.

The cockpit is very roomy, with lots of headroom and plenty of shoulder space, being a whopping 1.12m wide.



## FLY SYNTHESIS STORCH HSJ

Technical specifications

### Powerplant

One Jabiru 2200 producing 85hp (63kW) at 3300rpm. TBO 2000 hrs. 1.52m diameter, two-bladed, GT Tonni wood and composite, fixed-pitch propeller.

### Performance

(Manufacturer's quoted)

Sea level Vne 116kt

75% cruise 86kt

Economy cruise 60kt

Stall, full flap 35kt

SL take-off run 90m

SL landing run 130m

SL climb 787ft/min

Max endurance  
(45 min reserve)

3 hrs @ 75% power

### Weights

Equipped empty 240kg

Max takeoff 450kg

Max baggage 12kg

Standard fuel 60 lit

Load factors +4/-2g

### Dimensions

Wing span 8.71 m

Wing area 11.5m<sup>2</sup>

Length 2.4m

Height 3.16m

Cabin width 1.12m

Seating two abreast

### Manufacturer

Fly Synthesis, Provincial Road n.78, Km 12.150, 33050 Mortegliano (Ud), Italy.

[www.flysynthesis.com](http://www.flysynthesis.com)

### Dealer

Fly Synthesis Australia, Tel: 0404 897452 Web: [www.flysynthesis.com.au](http://www.flysynthesis.com.au).

### Price

Featured aircraft \$76,000 + GST. Kit price \$62,000 inc GST.



The author found it easiest to make all his approaches with full flaps and the throttle completely closed.

There was the tiniest buzz of warning buffet just a knot or so before the break, which was only a very slight nod. This aeroplane will teach students to keep the slip ball centred though, because if it is off to the side a little, the Storch will gently drop a wing, although only by 20 or 30 degrees or so, and this is promptly arrested by applying the appropriate rudder.

The behaviour was similar with 15 degrees of flap, and still pretty innocuous, but the stall happened at 38kt. This was depressed to 35kt with full (30 degrees) flap, but the Storch's manners were still impeccable. Recovery was instant once the stick's backpressure was released, and our total height loss in each stall was little more than 100ft. Stewart showed me it was possible to induce a real, proper, positive pitch down by heaving the nose up for a quick speed reduction, but that is unlikely to happen by accident.

What particularly impressed me was the remarkable low speed aileron control from the flapperons, once they were extended as flaps. Most flapperons I had previously experienced were dreadful, with severely degraded roll control once the flaps were down. Yes, the Storch's ailerons were a bit less effective with the flaps out, but not much, and they were not significantly heavier to operate, which was particularly pleasing.

The corollary to this is that the flaps do not produce an awful lot of drag. Indeed, the Storch glides so well it could almost qualify as a powered sailplane, despite the company quoting a fairly common nine to one glide angle. I am not alone in having had trouble descending on base leg when there were thermals around. Even with full flaps, that I had real difficulty getting down during our practice forced landing. Of course, you can sideslip (even with full flaps) and the effective controls allow a good yaw angle, but the fuselage is so skinny and

rounded that there is very little drag increase, so the descent rate is not greatly improved.

Because of this, I found it easiest to make all my approaches with full flaps and the throttle completely closed, modulating the descent angle with sideslip as needed (and the glide angle is so shallow I still felt as if I was dragging our wheels through the tree tops). The recommended approach speed is 60kt initially, reducing to 55 on final and 50 over the fence if it is not too gusty. The aeroplane is so light and the elevator is so effective that you can get down to head height before needing to flare. And at these low speeds there is not too much of a float, although if you come in a bit fast you can gobble up a hundred metres or so bleeding off excess speed.

The elevator is still very effective during the hold off, so care is needed not to over control; indeed, it is possible to keep raising the nose higher and higher for a proper, minimum speed touchdown. The undercarriage is very forgiving, making all my landings seem soft. Even after the main wheels are on the ground, you can hold the nosewheel off until the aeroplane is almost stopped (although you do need to be sure the nosewheel is centred before it grounds if you don't want a brief few seconds of excitement). Takeoff and landing performance are definitely STOL, and I found it simple to touch down and stop by Serpentine's first runway turn off, little more than fifty metres in from the threshold. Takeoffs can easily be made in even less distance.

I was very impressed by this lovely, agile little aeroplane, and thoroughly enjoyed flying it. It has superlative, unsurpassed, amazing visibility, excellent performance at low cost, and delightfully light and yet capable controls. The Fly Synthesis Storch may not have the looks of an Italian super-model, but she sure is a little beauty to fly. □