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FEATURES

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SLING HIGH WING

A Higher Plane

Sling has finally released the long-promised high-wing version of its fun yet extraordinarily capable lineup of light airplanes. The new four seater could be a bestseller.

By Guy Leitch

PHOTO BY GUY LEITCH

BACK IN 2008, THE AVIATION world sat up and took notice of a new brand of sport airplane made in South Africa by a company then known as The Airplane Factory and today simply as Sling Aircraft. A homegrown enterprise, the company's first plane was a two-seater, but it quickly stretched the concept into a four-place model, prototypes of which were flown around the world by two of the founders, South Africans Mike Blyth and James Pitman. And, naturally, they made stops in Wisconsin to show them off at the EAA Oshkosh AirVenture.

Pilots lined up to try them out and were enchanted by the fighter-like handling yet simple and affordable construction. And as much as customers loved the designs, from early on, there was a hew and cry for a high-wing Sling.

And Sling made it happen, though Sling had intended to fly the new Sling High Wing to AirVenture 2021, complete with a 17-hour flight over the Atlantic from Africa. However, COVID-19 quarantine requirements made that impossible.

GLOBE-TROTTING DEVELOPMENT

Ten years ago, on the last leg of another round-the-world voyage, the low-wing Sling 4 had shown its remarkable ability to lift a massive load and fly for 27 hours non-stop from Rio de Janeiro to Cape Town. It accomplished that two-up, including a cabin full of survival gear and baggage, with its basic Rotax 914 engine. Yet many wondered what the Sling 4 would be like with more power.

The advent of the Rotax 915 iS with 141 turbocharged horses provided Sling Aircraft with the opportunity to update the Sling 4 with not just the more powerful engine but also a new and faster wing. The result was the Sling TSi, which has become the aircraft in most demand from the Sling factory—particularly after a number of prominent social influencers in the USA began building their own under the 51% rule.

Slings use conventional pop-riveted aluminum and come in three levels of completeness: 1) ready to fly, which may be flown in the USA as a demo aircraft; 2) the quick-build kit, which conforms to the 51% rule; 3) the basic homebuilder's kit.

With more than 90% of the Sling Aircraft factory's production now sold outside South Africa, the Sling 2 and 4 range have been a phenomenal worldwide success. The demand kept the factory too busy to be readily distracted into designing and building the long-awaited High Wing. But it was always bubbling away in the background, and for a number of years The Airplane Factory (as it was then called) employed former Boeing aeronautical engineer Mel Verity to work on the fuselage modeling.

The Sling High Wing made its first flight as promised before the end of 2020. That development and construction had continued through the COVID-19 lockdown is testimony to the dedication and commitment the Sling team brought to the project. It took six months before the Sling Aircraft factory decided that the High Wing was developed enough for us to review, although Pitman insists it is still a prototype.

HIGH WING DEVELOPMENT

Reflecting the unexpected complexities of converting a low wing to a high wing, the Sling HW had an unusually long gestation. In the past, The Airplane Factory has shown itself able to create an all-new plane and just roll it out the hangar and fly it around the world. The Sling 4 launched on its round-the-world flight a mere 20 days after first flying.

SPECIFICATIONS

ENGINE	ROTAX 915IS
HORSEPOWER	141HP (TURBO)
WINGSPAN	31.3 FT
LENGTH	23.6 FT
HEIGHT	8.6 FT
SEATS	4
CABIN WIDTH	46 IN
TYPICAL EMPTY WEIGHT	1,220 LB
USEFUL LOAD	1,080 LB
MAX TAKEOFF WEIGHT	2,300 LB

PERFORMANCE

MAXIMUM SPEED (VNE)	155 KIAS
CRUISE SPEED, 9,500FT	145 KTAS
STALL SPEED, CLEAN	57 KIAS
STALL SPEED, FULL FLAPS	48 KIAS
MAX DEMONSTRATED CROSSWIND	15 KTS
TAKEOFF GROUND ROLL, CONCRETE	720FT
LANDING DISTANCE	492FT
RATE OF CLIMB, SEA LEVEL MAUW	1,000FT/MIN
MAXIMUM OPERATING ALTITUDE	18,000FT
ENDURANCE	8 HOURS
RANGE: 75% POWER, 45 MIN RES.	880 NM

PHOTO BY GUY LEITCH

Sling Aircraft's formula of offering customers an easy-to-build, fun to fly, economical and capable personal aircraft has made its models popular the world around. Its new four-seat models are sure to continue that trend.

The big change was the advent of the Rotax 915 iS in 2018. Unlike Rotax's first attempt at fuel injection—the underwhelming 912 iS—the 915 really was a big step forward. To match the new engine, the renamed business Sling Aircraft took another huge leap for the development of the Sling TSi. The company gave it an all-new wing, replacing the NACA 4415 aerofoil with the slimmer, shorter (31.3 feet) and thus faster NACA 2414. This wing is used unchanged on the High Wing.

A major design departure from the low-wing series is that a composite structure is used to handle the loads and compound curves required for a smoothly shaped high-wing cabin. It had been hoped that building the High Wing would involve just a new center fuselage section, but things are not that simple. At higher angles of attack, the high wing blanks the empennage, so the vertical fin has been made 8 inches longer than the Low Wing's.

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I met the high wing (HW) in the flesh for the first time at Sling Aircraft's Tedderfield factory south of Johannesburg. The airfield is on the South African Highveld and is situated at 5,200 feet, which challenges the performance of many light aircraft.

Parked on the apron, it looks bigger and somehow more substantial than the Low Wing TSi—and it is. As a 6-footer, I can walk beneath the wing. The wing has zero dihedral along the top, but as it tapers in both width and thickness, it may appear to have some dihedral. The absence of dihedral contributes to the much-admired Sling balance between lateral stability and control responsiveness.

Blyth points out that stability in roll is naturally there because of a high wing's pendulum effect, so the dihedral can be and is less than on the Low Wing. However, this led to unexpected challenges in designing the fuel system for the standard 26 gallons fuel tanks in each wing, as dihedral naturally gives fuel a downhill run from the outer reaches of the tanks. The Sling High Wing I tested was equipped for the Oshkosh flight and had optional auxiliary outer tanks that feed the inner standard tanks for a total of 65 gallons. These then route through the fuel selector in the cockpit roof and down to a 1.5 gallon header tank mounted behind the firewall.

The Sling HW and TSi are immediately distinguishable by the large NACA duct on the right side of the cowl, which feeds air into the 915 iS engine's high-volume intercooler.

Unlike the Low Wing, with its gullwing doors, the HW doors conventionally hinge at the front. The composite doors can be slammed with reassuring

The addition of the Garmin G3-X avionics package, with its sophisticated, integrated autopilot, gives this new generation of Sling aircraft a panel that rivals or surpasses the best certificated light aircraft.

LEFT: A redesigned tail section contributes to the High Wing's pleasing control harmony and good controllability even at slow speeds and high angles of attack.

RIGHT: Designers found that at higher angles of attack, directional control was compromised by blanking of the tail by the fuselage. A taller vertical and rudder solved the issue and still looks very Sling-like.

firmness, but there is a need for further development to stop the top of the door from bulging out at cruise speeds. To avoid the complexity of dual latches (like a Cherokee), Sling ingeniously tried magnets on the prototype, but what that will do to the compass is anyone's guess!

I'm always surprised by how much room there is within the compact dimensions of the Sling 2 and 4 and, in particular, what a great sense of space there is in a Sling cockpit. The HW is even bigger thanks to its composite cabin shell. Although Pitman is a skinny fellow, there was no shoulder rubbing between us during the test flight.

The rear seaters should now have more headroom, too. However, the prototype's rear seats were thickly cushioned, so the headroom not as good as I had expected. This is, however, easily fixed by lowering the seat squab and perhaps reclining it more, as in a Cessna 182, where the backseat passengers are essentially sitting on the floor. The view out from the backseats is excellent, thanks to the large windows.

The simple but strong bowed composite main undercarriage legs are standard-issue Sling hardware. They are mounted to the bottom of the monocoque fuselage with minimal change. The nosewheel is also unchanged, allowing the same firewall forward installation as on the low-wing TSi.

Despite our test aircraft being a prototype, it had a smooth finish from flush rivets on the wing leading edge. There is a large tear-out panel on the rear turtle deck with slotted rivet holes for the ballistic parachute cover.

FLYING THE SLING HIGH WING

Getting into the cockpit is easy. I placed my foot on the far side of the control stick and then hoisted myself up and onto the seat. However, it may have been more elegant to have used the little step on the undercarriage leg. I had been expecting a four-point harness, but the seatbelts are conventional three-point car types, with a single inertial reel.

Starting the 915 is simple. Flip on the two ignition lane switches and the two fuel pumps and turn the ignition key. The Rotax springs readily into life, and, compared to earlier engines, has less clatter from the prop gearbox thanks to its larger impulse damper.

Despite the weight of the complex engine, turbo and intercooler in the nose, and the forward CG as we were two-up with lots of fuel and no baggage, the Sling HW is still light and easy to taxi with its tricycle gear and nose wheel steering. I far prefer a steerable nosewheel to a castering one that relies on differential braking. I was pleased to see that both seats have toe brakes.

PHOTOS BY BRUCE PERKINS

At the holding point, testing for full and free movement of the controls revealed a potential problem—with full back stick, the full left and right movement of the stick was limited by the V of my legs. Pitman says that they will adjust the bend in the stick and reduce the amount of stick throw movement required for full aileron deflection.

The electrical unslotted flaps have a rotary knob with pre-marked positions: Up, 1, 2, 3 and Down. With the flaps selected to 1, I applied full power against the brakes, which were powerful enough to hold the straining 141 horses with ease. At high power settings, the 915 goes to auto rich and has a huge thirst for such a small engine, sucking 13 gallons per hour.

On brake release, acceleration was good, without excessive right rudder, and at the recommended 55 knots rotation speed, it felt ready to fly. And this is where there was a significant difference with the Low Wing, as the High Wing does not produce the same amount of ground effect as the Low Wing. So, there was no gradual float into the air; rather, it required back pressure on the stick, and then we were airborne with a bit of a lurch, thanks to my rough hands, and the stall warning bleeped briefly in disapproval.

We were almost instantly at Vy (best rate) climb speed of 75 knots, indicating a healthy 1,200 fpm over the runway end. It was natural to lower the nose to 95 KIAS and still be climbing skyward at over 750 fpm. It was a turbulent day, so it was hard to get clear vertical speed numbers.

The graphics on the large Garmin G3X EFIS make situational awareness a treat. The large 10.6-inch screen dominates the instrument panel. It easily has enough space to display all the instrument and navigation requirements. There is even an option for TCAS, and, for the Oshkosh trip, a Bluetooth satellite phone had been added as a spare radio.

A huge benefit is the intelligent and smooth Garmin-integrated auto-pilot that can be programmed to maintain altitude, direction and attitude and even fly a coupled approach. A particularly useful trick Pitman had was to simply push the blue "level" button when he wanted to explain something.

Sling aircraft are a delight to fly thanks to the designers' commitment to the military specification of control forces being 1:2:5 for roll, pitch and yaw. One of the big challenges the design team faced with the high wing was how to preserve the Low Wing's crisp control response with the low breakout forces from having almost frictionless pushrods to the ailerons and elevator. Having to route the aileron controls through the floor and up the door pillar necessitated control cables. Yet it was immediately apparent that the breakout forces are still commendably low, and the response is still crisp yet without twitchiness.

Even though we were 7,000 feet, which is far below the aircraft's best operating altitude, I explored the Sling HW's speed capability. The EFIS displays power as a percentage of total rated power, and at around 82%, it changes the engine management from producing best power to best efficiency. Thus, at 81% power, the fuel burn is 9.2 gph, while at 80% the fuel burn drops to 7.4 gph.

Thanks to the large intercooler, a typical cruise with the HW is 38 inches of manifold pressure with the prop set at Cruise for 5,100 rpm, which gives 80% power. Pitman says he works on 145 KTAS at 7.4 gph at 9,500 feet. And this seems realistic. This makes it about 3 knots slower than the Low Wing TSi.

The cockpit noise levels were low compared to most production aircraft, and as we cruised, my spirits lifted with the responsiveness of the aircraft, the smooth and plentiful power, and great view out. You really do feel at one with the plane in a Sling. And the cabin is tall enough so that you do not have to wind your neck in to see out the side window beneath the wing. Naturally, though, the visibility in a turn is not as great as from the Low Wing with its side windows that curve over the front seats.

> The Sling HW put a smile on my face for the entire day. This fantastic aircraft delivers a simple and rugged design paired with Rotax's very impressive 915 iS engine.

I tested the control harmony and roll response by cranking it over into about a 75-degree bank. It effortlessly maintained height, even though the stall warning beeped occasionally. With a full throw of the stick, a 150-degree roll reversal was smooth with little tail wag, although my feet needed practice on how little lead with the rudder it required. A few practice rolls around a point would make a smoother transition.

I pulled the power back, thankful that liquid cooling vastly reduces the chance of shock cooling the engine. With the flaps up and the nose surprisingly high, the stall break came at 57 knots—2 knots faster than I had seen in the TSi—but then it was a bumpy day. I held the wing in a deep stall and tried to keep it straight with aileron until it would take no more abuse and gently dropped the nose. The recovery just required relaxing the back-pressure on the stick.

With full flap and power off, the nose stubbornly

PHOTO BY BRUCE PERKINS

clawed for the sky, and the airframe shook until the stall break came at 47 knots—with a still-gentle nose and wing drop. We recovered with barely 500 feet of altitude loss. It should be impossible to get it into an unintentional spin. I could easily hold the stick almost all the way back and just wallow down at about 600 fpm at around 46 knots—a survivable escape from IMC. Nonetheless, a ballistic parachute is a popular option.

Even deep in the stall, the elevator authority is excellent at full-forward CG. Unique to the High Wing, Sling has fitted an anti-balance tab to the right-hand elevator to lighten the stick force when full up-elevator is needed, such as on landings.

Another big, highly anticipated change was the move to the Rotax 915 iS aero engine. This latest hardware from the Austrian engine maker helps give the High Wing four-seater enviable climb and cruise numbers, albeit with a small but significant increase in fuel consumption.

Returning to the Tedderfield pattern, we joined a Right Downwind for 11. Trim changes with flap were so small, I hardly noticed them, and selecting Flap 3 caused a slight nose-up pitch, which could easily be compensated for by reducing the power for the glideslope.

We tracked down final at an easy 70 knots—a bit fast but a speed I (and the plane) felt comfortable with. Pulling the remains of the power as I crossed the fence, the controls remained effective all the way to touchdown at around 45 KIAS in a gusty crosswind.

FOUR SEATS, BAGS AND FULL TANKS?

There is ample space for four occupants and a generously sized baggage compartment—large enough to take a Sling bicycle. The empty weight of the plane we tested, which was fully kitted for the hoped-for Oshkosh safari, is 1,250 pounds, with a 2,310-pound max takeoff weight, so there is a 1,060-pound useful load. Full standard fuel of 45 gallons weighs 270 pounds, so with the large fuel tanks filled, you can put 790 pounds of people and stuff in the cabin. It's a genuine fill the tanks, fill the seats, add bags and go plane—a rarity indeed. However, attention must be paid to the center of gravity as heavy baggage and rear seaters will push the rearward boundaries of the CG envelope.

With the additional structure of the composite center fuselage, larger empennage and other changes, the Sling HW weighs about 160 pounds more than the Low Wing. However, this is more than compensated for by the maximum all-up weight increasing from the Low Wing TSi's 2,090 pounds to 2,310 pounds. Blyth says that due to the uninterrupted high-wing area, there is more lift than on the Low Wing, which has allowed the 220-pound increase in MAUW.

The Sling HW put a smile on my face for the entire day. This fantastic aircraft delivers a simple and rugged design paired with Rotax's very impressive 915 iS engine.

The Slings have come a long way since the prototype Sling 2 flew in 2006. One of the most impressive aspects is the quality of finish, even for a prototype. The panels fit well, the paint job has a deep luster, and the standard of the interior finishes, such as seats, are worthy of a supercar. And it is the performance numbers that really blow you away. It is a true four-seater with a cruise speed of 145 knots at just 8 gph per hour. In comparison, a Cessna C182 of similar value will struggle to do 135 to 140 knots burning 12.5 gph.

The Sling HW is a fantastic all-rounder: rewarding to fly, with astounding flight instruments and responsive yet delightfully light and well-proportioned controls that make you feel at one with the machine. And best of all—at about $200,000, ready to fly (though not in the United States, as yet) with a high specification, it's a worthy competitor to type-certified four-seaters that are three times as expensive to buy and run.

Sling Aircraft has established a strong following in the USA with dealers and support across the continent. Visit www.airplanefactory.com. **PP**