

Jonker JS-2 Test Flown

The New Self Launcher with
Major Production Changes



Many pilots have been patiently waiting for this high-performance, versatile, easy-to-fly self-launcher. Finally, JS has completed the development of their cutting-edge sailplane - the JS2 Revenant. The JS design team claim they have met most pilots' desires in a self launcher – great handling, good reliability, a powerful engine to take-off from short grass strips and with the endurance to travel under power to nearby mountains. The Jonker design team have captured their aims in a slender airframe, which will inevitably provide the gliding performance required to challenge world records and win contests.

The JS design team has said that they aimed to meet pilots' desires in a self launcher – great handling, good reliability, a powerful engine to take-off from short grass strips and importantly "power endurance". They have captured all those demands in a slender airframe that opens up strong potential to effectively challenge world records and win contests.

The JS philosophy is based on finding the right compromises, produce a superior product that is the most sought after glider in the world.

Originally, they planned to release the JS2 self launcher in 2017 and were well on track with that plan. A re-evaluation of their strategic plan based on market research indicated a larger long term market share awaited the company if they restructured their product range carefully. As a result, Jonker fast-tracked the JS3 and defined and scheduled the development of their future product range.

This decision was a hidden blessing – their design team gained invaluable experience, and more formal design processes were introduced based on Aerospace Standard AS9145 for the Product Development Process (PDP) through the use of Production Part Approval Process (PPAP) methodologies. Every part, every fastener, every wire, every fitting and attachment was designed and imported to the final assembly model to check for possible integration oversights. DFMEAs (Design Failure Mode and Effects Analysis) were performed on most critical components and various design change iterations were conducted to lower the risk probability numbers before moving to the prototyping phase. "Following a formal design process is time consuming but the advantage is that industrialisation and certification is much faster," JS engineering manager AP Kotze explained.

PERFORMANCE is Not Optional - The JS2 may be regarded as a product aimed for the larger recreational market. Nevertheless, Jonker Sailplanes' unwavering dedication to the ultimate performance and aerodynamic excellence resulted in the creation of the Revenant.

Using the proven high performance JS1-C airfoil sections, combined with a new optimised fuselage design, the JS2 is not only expected to be highly competitive in the 18m configuration but should also be a serious contender in Open Class. "The JS2 has a slight performance advantage on the JS1-C, which was already a great performing glider with a best L/D confirmed by the Idaflieg of 63:1," said Dr Johan Bosman.

Pilot COMFORT is Crucial - Easy handling and pilot comfort has become a critical customer requirement. The JS2 cockpit architecture is based on the JS3 cockpit but with increased width in the shoulder area. Pilots up to two metres tall should not have any comfort issues. The instrument panel size has been increased and moved closer to the pilot to improve the ergonomics. Instrumentation readability in bright conditions has been materially improved.

Rudder pedals are now adjustable electronically, and the seat back is adjustable in flight with the aid of a lockable gas strut. And although JS gliders are renowned for their great handling qualities, but customer feedback suggests that increased rudder authority in the 21m wingspan should be considered. The design team accepted the challenge and designed an improved rudder system with 40% higher efficiency and a significant reduction in pedal forces.

Control forces have been re-modelled resulting in light and balanced "typically pleasant" JS handling. "Female pilots will no longer struggle to lock the air brakes or retract the landing gear,

and will definitely not get tired with high control forces, even when flying out of trim" according to Uys Jonker.

Ballast Water filling is done through ports on the upper skin, and one-way valves prevent water from syphoning when one wing is on the ground. The left and right main tanks are mechanically connected to prevent asymmetrical dumping with electrical activation.

Reliable Propulsion is acknowledged as a 'Must' - The new self-launch system has been developed around customers' non-negotiable requirements – reliability, performance and ease of use. The engine selection process was no trivial task as only EASA certified engines were considered. Just two engines made the primary specification, the Astro rotary 50 h.p. EA50 and the 68hP 2-stroke Solo 2625 02i Neo.

Although the rotary engine is compact and runs with very low vibration levels, the more powerful Solo engine was selected. The design team have been faced with the major challenge of managing the vibrations generated by the engine. After vibration modes were modelled, four shock mounts instead of the normal three were designed to optimise protection to the fuselage and surrounding components in the extended position. The V-belts concept instead of a tooth belt has seen a major damping of engine/propeller vibration.

Fuel injection has been selected to enhance reliability and performance in various atmospheric conditions. SOLO developed a new fuel injection system with significant improvements in redundancy. Their latest design, the 2625 02i Neo, has resulted in a very elegant, reliable system, ideal for the JS2.

JS have designed a purpose-built propeller with a slightly reduced diameter and lower aspect ratio. Power curves were selected with

sufficient static thrust but still able to prevent the engine from over-speeding at airspeeds up to 120 km/h. The ground static tests suggest that the climb rates at maximum weight will be very impressive – a major safety requirement. Meanwhile the fuel system consists of a 12 litre main tank in the fuselage, and 2x12 litre integral wing tanks. To reduce the probability of fuel leaks, JS selected modern automotive industry standards by incorporating submersible fuel pumps for the fuel supply. The Engine management system, developed by LXNAV, has been designed for minimum pilot workload. A 57mm colour display unit has a three-position switch to control the pylon position and enables the ignition. A start button on the stick can only be activated when the engine is fully extended. Throttle control is provided by a mechanical lever positioned on the left hand side of the cockpit console. Retraction now activates automatically. A mechanical prop brake handle is provided to stop the propeller and a mechanical activated finger-type prop-stop advances in the propeller's path before retracting to a low-drag cooling position. Provision is made for an emergency mode to enable the pilot to retract /extend the propeller in case of system failures or if logical conditions cannot be met.

The completion date of JS's most modern sailplane must now be regarded as "almost there!". Development challenges have been overcome – consequently the JS2 prototypes progressed at an increasing pace. All mechanical systems function according to design. Final design inspections have been completed on the fuel system with the electrical system following.

The maiden flight has been achieved (a major success). This highly desirable recreational self launcher will definitely experience increased demand for the planned JS-5, a new Open Class glider based on the JS2.

