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Dear SD-1 Minisport Enthusiast,

Thank you for your interest in the lightweight and efficient SD-1 Minisport. Below is some general information on the construction, materials used and expected performance of this advanced aircraft. The SD-1 Minisport falls under the Australian CAO 95.55 para 1.5 category (19-xxxx registration number) and requires a RA-Aus pilot certificate. Please note that I have approval for an increased MTOW of 255kg (up from 240kg) for amateur-built aircraft. This will allow pilots up to 100kg to legally fly with full fuel and 10kg of luggage behind a 4-stroke engine.

Certification of the ready-to-fly (RTF) plane is not feasible at the moment as the plane is certified to the European Microlight category, not LSA.

The SD-1 Minisport Design Philosophy

The weight of an airplane has a direct influence on its performance. The design philosophy of the SD-1 is to keep weight as low as possible while keeping good performance and handling suitable for low time pilot, at the same time keeping it simple to build. Historically, the lightest airplanes have always been made of wood. Every boy has tried to glue together a wooden plane or boat. The SD-1 is really just a bigger model, so the average builder should have no problem finishing the plane. The development of new materials continues non-stop. We are now seeing items in daily use made of carbon composites, with its incredible strength and light weight. Its strength/weight ratio deserves its use in places with high load concentration like spar caps and similar. Top properties are achieved using a technology called pultrusion. This is a fully automated process which assures constant quality of production and mechanical properties. That is the reason why we use it in spars and reinforcements of fuselage undercarriage mounts. The main wing spar weights 2 kg (ultimate load 7.5 g) thanks to this material. The MTOM/empty weight ratio is better than 2:1.

The design is very simple. The wing ribs and the ribs of all other flying surfaces are made of extruded polystyrene and then covered with plywood. The fuselage is a timber truss and also covered with plywood and composites are used on complex shapes. The engine power range is from 22 to 50 HP that should fulfil requirements for every builder. Assembly and disassembly of the plane is possible by one person in a short time.

The plane fulfils requirements of both FAI UL and LSA regulations and also the new German 120 kg empty weight category. The recent release of the SSSR (Single Seat De-Regulated) class in the UK has prompted a number of new projects in that country.

The aim of our company is the best possible support for builders of this plane and promotion of "small" aviation for everybody.

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The SD-1 Minisport Technical Data

Both Tail Draggers and Tri Gear versions are available. Both versions can be built as XL-version for tall pilots.

Fuselage: The fuselage is of wood truss design with mainly 15x15 mm section wood covered with plywood of 0.8-3 mm thickness. The pilot seat back is inclined by 40°. This assures comfort also for 185 cm (6.1 ft) tall pilot in standard version. The optional XL cabin has 50mm more headroom for taller pilots. The inside width of cockpit in shoulder place is 54 cm (21.3"). The plywood tunnel with wing and upper gear legs mounts (TD) is under the pilot's knees. The baggage compartment of 40 l (1.5 ft³) is behind the removable seatback. An additional baggage compartment could be made behind the pilot bulkhead. The lockable composite canopy with polycarbonate windshield of 1.5 mm thickness opens to the RH side. A NACA inlet for ventilation is on the RH side of the canopy.

Wing: The two part wing uses GA 37U-A315 airfoil. It consists of composite main spar with carbon caps to which the extruded polystyrene ribs are glued and covered with 1 mm plywood. Wingtips are made of extruded polystyrene with fibreglass layup or pre-moulded vacuum bagged sandwich. The weight of a painted wing half is 12 kg (27 lbs). Connection of wings to fuselage is made through two main and two auxiliary pins. Disassembly of wings takes 5 and assembly 10 minutes. The connection of flaperons to controls is performed by simply inserting the control pin into a slot.

Tail: The all movable horizontal tail (HT) has anti-servo tab and is statically balanced. The tail is of similar construction to the wings - a composite spar with attached polystyrene ribs and plywood skin. Spring trim is under the pilot seat. Disassembly of HT is made thru disconnection of control and tab rods and pulling out a pin. The fin has main composite spar with carbon caps and HT hinge.

Undercarriage TD: The legs of main gears are made of pultruded fibreglass rods. The wheels are 12x4" size and are braked using mechanical drum brakes. Tail wheel of 100 mm (4") diameter is controlled via ruder and is attached to the fibreglass spring.

Undercarriage TG: The single piece leg of main gear is made of glass roving/epoxy composite. It is fixed on the bottom of fuselage using 4 bolts to reinforced structure. The wheels of 12x4" size are braked using mechanical drum brakes. The nose gears consists of cantilever leg made of CrMo steel tube 25x2" with free-swivelling fork made of carbon/epoxy composite. The wheel size is 260x80. A steerable nose wheel is available as an option (requires the option "adjustable rudder pedals").

Controls: The horizontal tail and flaperons are controlled via pushrods and bell cranks. The flaperon mixer is under the seat. The rudder is controlled via 2mm cables.

Engine: Planes built so far are powered by Hirth F-23 AS (50hp) or B&S Vanguard 630 (24hp) and a 750cc industrial V-twin engine. Due to the threat of legal action, we can't use the word "K....r" any longer. For the last 4 years, this 750cc V-twin of 30hp has become the choice for many builders in Europe due to its favourable cost and availability as carburetted or FI engine. A new 810cc engine with approx 33hp has just been released, called the SE33. It is considerably lighter than the SE31 and slightly more powerful.

It is possible to use any engine in the 24-50hp power range up to 40 kg (89 lbs) weight (engine, propeller, engine mount, cowling, exhaust). This criterion fulfil e.g. Hirth 2702, MZ201, Simonini Victor 1, 2SI 460 etc. The purpose-built Verner JCV-360 (35hp) is no longer available.

The ideal power range is from 30 to about 40hp. Under 30hp is only for very light pilots/aircraft and moderate climates. High temperatures and altitude and heavier pilots require a minimum of 30hp to take-off and climb safely.

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Fuel system: The integral tank of 28 lt (7.4 US gal) capacity (34 lt available as an option) is placed behind the engine firewall. It is made of fibreglass-PVC foam sandwich. A fuel tap on the tank outlet is operated from the instrument panel. The fuel gauge is a sight glass (plastic tube) on the instrument panel.

Electrical system: The main bus is powered by the battery and is charged by the alternator. The electrical system will depend on type and number of instruments installed.

Instruments: The airplane can be fitted with basic flying instruments - airspeed, altimeter, compass, vario and slip indicator. An EFIS up to Dynon SV-D700 size could be used. There is enough space for any engine gauge combination and a COM transceiver and transponder with a diameter of 57 mm in the instrument panel. The COM antenna is built in the fin leading edge.

Rescue system: There is space for the installation of a rescue system. The container attaches to the fuselage bulkhead behind the pilot's back, with the front ropes attaching to the upper engine mounts. The auxiliary rope is attached to the fuselage behind the cabin. The main system used is the Galaxy GRS 4/240. The heavier MTOW in Australia requires the Galaxy GRS 4/270 system in soft pack.

Specifications and Performance (see also www.sdplanes.com/new/engine-kits/)

	SI units	Imperial units
Wingspan	6.0 m	19.68 ft
Length	4.35 m	14.27 ft
Height	1.23 m	4 ft
Wing area	6.0 m ²	64.6 ft ²
Empty weight (1)	110 kg (115 to 125kg with 4-stroke engine)	245 lbs (253 to 275 lbs)
MTOW (increased for Australia)	255 kg	560 lbs
Payload (pilot & luggage) (1)	115 kg	253 lbs
Maximum pilot weight	105 kg	233 lbs
Tank capacity	28 l	7.4 US gal
Engine power (1)	23-25 kW	31-33 hp
Fuel consumption (1)	5-6 l/h	1.3-1.6 gal/h
Service loads	+4/-2 g	
Estimated Performance with increased MTOW of 255kg and 33hp 4-stroke engine		
Stall speed no flaps V _{S1}	80 km/h	43 kts
Stall speed with flaps V _{SO}	65 km/h	35 kts
Cruise speed	165 km/h	89 kts
Top speed	185 km/h	100 kts
Climb speed	3.5m/s	690fpm

(1) SE31 or SE33 V-twin, 4-stroke, 31-33hp, no rescue system

NOTE: actual weight and performance will vary with options and accessories, engine type, engine hp and propeller fitted. The above figures are estimates based on some flying examples.

SD-1 Minisport currently flying

As of July 2015, over 40 SD-1 Minisports are flying. For details, see the separate "SD-1 flying" list.

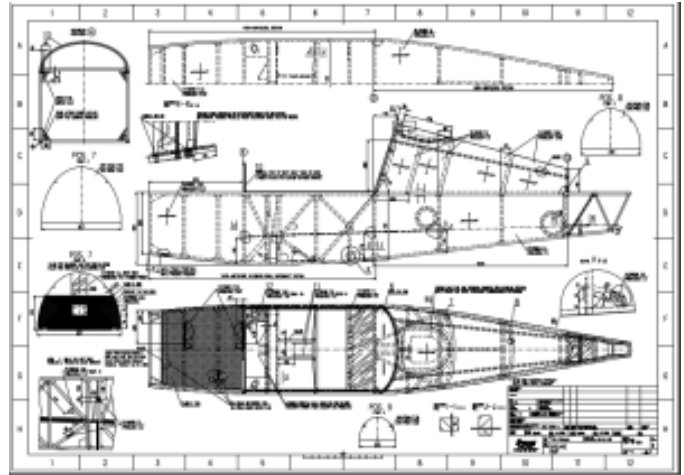
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The SD-1 Kits, Sets and Airplanes

Plans:

The drawings in English and drafted in CAD, are printed on 31 sheets of A1 size (594×841 mm, 23"×33") and 15 smaller sheets. All complex curve parts are printed in full scale for simple templates making. The construction manual and material list is included.

Important notice: the main wing, elevator and fin spars are not included in drawings. These parts are made by vacuum bagging technology and due to this are delivered in basic kit (cannot be built by the builder)



Additional drawings available:

- Full-size fuselage sidewall
- Composite parts drawings (for builders who want to make their own composite parts), contains all templates and additional drawings to make the composite parts (fuel tank, canopy, wing tips etc)

Basic Kit (*This kit is necessary for construction*):

Contains main wing spars, elevator and fin spars and pultruded carbon strips for fuselage reinforcements. The elevator pivot is included on the elevator and fin spars and the main spar is fitted with bushes and connecting pins. All spars have caps made of carbon fibre and are manufactured from certified materials. Thanks to this technology, a single main wing spar weighs only 2 kg (4.4 lbs).



Basic+ Kit:

Same as Basic kit but includes the fuselage tunnel. This kit saves the builder from the most complex building stage - levelling of wing spars and fuselage tunnel together and reaming of the bushes. The company's fixtures assure best possible precision. It saves approx 40 hours of work and the cost for a 12 mm reamer.

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Sub-Kits (for use with basic kit or basic+ kit):

Undercarriage:

This set contains: complete main undercarriage legs including fittings, complete wheels with drum brakes and complete tail wheel.

Strongly recommended as the gear legs are specially made to include the spring element (deflection).



Undercarriage parts Tail Dragger (TG) Undercarriage steerable nose wheel (TGC)

Composite parts:

The set contains all composite parts except the parts supplied in the **Basic Kit**. Front upper part of fuselage from firewall to cockpit containing fuel tank ready for assembly on fuselage, wing and horizontal tail tips, canopy frame, seat (Kevlar), gear leg and wheel fairings and fuselage-wing fillets.



This kit will save a lot of time building fixtures and sanding foam to achieve a perfect finish. The parts are of very high quality and very light.

Metal parts and hardware:

Contains all metal parts and hardware used on the airframe except of undercarriage.

This kit again will save a lot of time cutting, welding and drilling/machining small parts. If you don't own or have access to a good machine shop and welding equipment, purchase this kit. It will also save a lot of time looking for the small bolts, washers, nuts and other common hardware.



Rib kit (foam kit):

Contains ready to use CNC cut ribs for wings, flaperons, horizontal stabiliser, fin, rudder and fuselage (turtle deck) bulkheads.

More of a convenience, ribs are easy to cut with hot wire and templates.



SINGLE PARTS:

You can buy any single part you may need. The part listing is included in the price list.

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Airframe Material Kit:

The “Material Kit” consists of wood (spruce) and plywood raw material. This kit also contains ribs, the complete undercarriage, controls, hardware and all composite pre-moulded parts and canopy shield ready to use. Includes plans and construction manual.

An option available is the pre-built fuselage side frames.



To reduce crating and shipping costs, a “Mini Material Kit” is available that contains all material except the wood, plywood, ribs and glass mats and liquids.



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Airframe 51% Kit:

This kit is suitable for builders from countries with the 51% rule for amateur built aircraft. The wings are finished with the upper skin attached so that the inside of wing could be checked by authorities before closing. The fuselage is assembled to the stage without tank, canopy, firewall and fin and lower fuselage skins. The construction of the tails and flaperons is left to the builder. Undercarriage, controls, hardware and all composite pre-moulded parts are included. Options like rescue system preparations are available.



Airframe Quick-build Kit:

Not Available in Australia as it doesn't meet the 51% rule under CAO 95.55 para 1.5.

READY TO FLY AIRPLANE:

Not being considered at this stage due to LSA certification requirements in Australia.

New Bubble Canopy:



Note: Kits to Australia are shipped without glue and varnish (dangerous goods), the same brand as used by the factory or equivalent products can easily be obtained in Australia.

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Engine Kits:

SE31

Direct-drive, 4-stroke, 750cm³
30hp industrial engine converted to aircraft use
31hp in this configuration
Kit includes all parts firewall forward



Hirth F-23

50hp aircraft engine
2-stroke, 521cm³
Belt-reduction, dual ignition (option)
Available carburetted or fuel injected



SE33

Direct-drive, 4-stroke, 810cm³
30hp professional mower engine converted to aircraft use

Will replace the SE31 engine

Link to video of running engine:

<https://www.facebook.com/spacek.ltd/videos/515563808647321/>



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The SD-1 Versions

Also check-out the manufacturer's website here: <http://www.sdplanes.com/new/sd-1-versions/>

Tail dragger



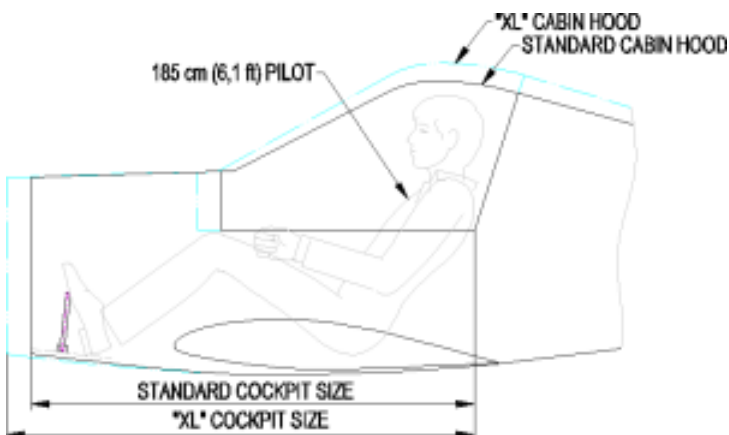
Tri gear



Available with free-swivelling (right) or steerable nose wheel (left).

Options available for all versions:

- XL canopy (+50mm cabin height)
- XL fuselage (+50mm leg room)



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