SAMAD aerospace

Foreword for investors

The following brochure shows you the vision of **Q-Starling**. In terms of design, it is a balance between style and practicality, performance and the laws of physics, pragmatism and optimism.

Q-Starling is unique in the world of e-VTOLs, in that it requires no new infrastructure, no new air traffic management and no fully autonomous flight or air traffic management. With Q-Starling, SAL have hit on a beautiful synergy between engineering design, regulatory/technological constraint and business opportunity.

e-VTOLs designed for the Urban Air Mobility (UAM) market are the very epitome of risk. The aircraft will require huge investment, but as business and technology are still on the steep part of the learning curve, most will become obsolete within a matter of years, perhaps even before they enter service. There is no certainty that regulators will change the rules allowing flight over populated areas and will certainly not allow a “free-for-all” of *go-anywhere* air taxis; in which case, the market will demand air-busses rather than air taxis

So for vehicle developers like Samad, **UAM** is a moving target. There can be no certainty in the design requirements other than the vehicles will have to be cheap to buy, so volume production is always assumed. However, investment in automated volume production is also a massive risk without all of the other pieces of the jigsaw in place.

However, we at SAL are e-VTOL developers. Our **e-Starling** is designed to fit into existing regulations and infrastructure, but e-VTOLs (particularly large, high performance ones like **e-Starling**) remain a major technological challenge, therefore SAL engaged in a series of sub-scale demonstrators, culminating in the S5, which is approx. half the scale of **e-Starling**.

The next from S5 to **e-Starling** remains a very big one, so SAL’s CEO set me the challenge of re-designing the S5 for an executive private owner market; from this, **Q-Starling** emerged. I tried to remain grounded in terms of technologies and configuration, but focussed on performance, style and practicality. I wanted to create something that was high performance but with the ability to take-off and land vertically. Knowing that costs were not a major consideration was extremely liberating, as it allowed me the use of the best materials, and the best technologies to produce something that any wealthy owner would be proud to own.

Q-Starling exists on its own merits, but the experience will put SAL at the head of the game when it comes to **e-Starling** development and certification and is consequently a major strategic advantage for SAL.

In conclusion, **Q-Starling** maintains the KISS maxim (keep it simple, stupid) applies in spades, and finds amazing synergies between technology, and regulation to create an exciting commercial opportunity within a quantifiable and realistic high value market

*Norman Wijker; CTO Samad Aerospace, Designer of **Q-Starling***

A new dimension in Personal Air Vehicles

Samad Aerospace present a new paradigm in PAVs: it is a Jump-jet for the Jet-set; a Maserati for the 3rd dimension; it is performance dressed in a sharp Italian suit.

Q-Starling is a clever mix of fighter jet and VTOL, allowing you to fly from a tennis court or super-yacht helipad to an event 500 miles away in under 2 hours.

The design brief was simple:

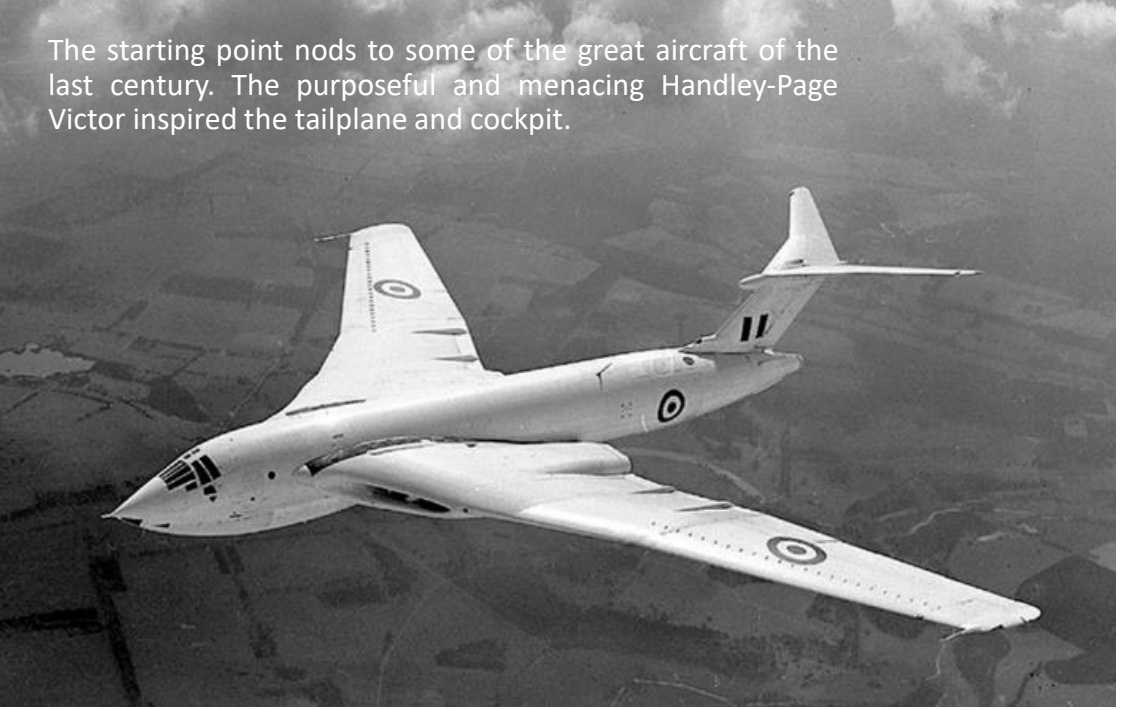
- *Ensure high performance + VTOL.*
- *Prestige build quality such as you may find in a Maserati.*
- *Elegant, classic looks.*
- *Brand attention to design detail.*

*Vertical Take-off and Landing

"Perfection in design is achieved not when there is nothing left to add, but rather, when there is nothing left to take away"

Antoine de St.Exepury

Design inspiration



The starting point nods to some of the great aircraft of the last century. The purposeful and menacing Handley-Page Victor inspired the tailplane and cockpit.

The intakes will seek to emulate the Meredith effect from the superlative North American P51 Mustang.

While the Hawk's simple but elegant wing provide a very clean look.

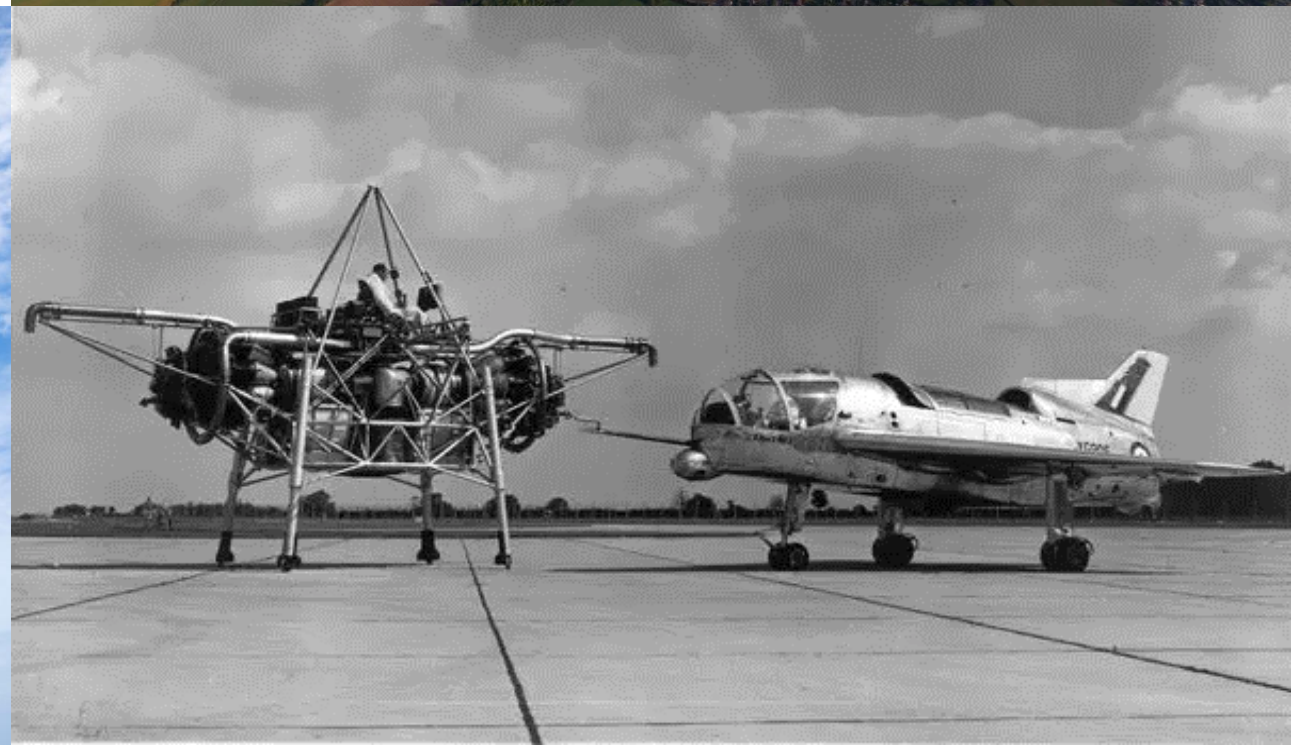
…and the forward fuselage/cockpit embodies the design language of modern sports cars such as Aston Martin, Jaguar or Maserati.

Must VTOL aircraft always be ugly?

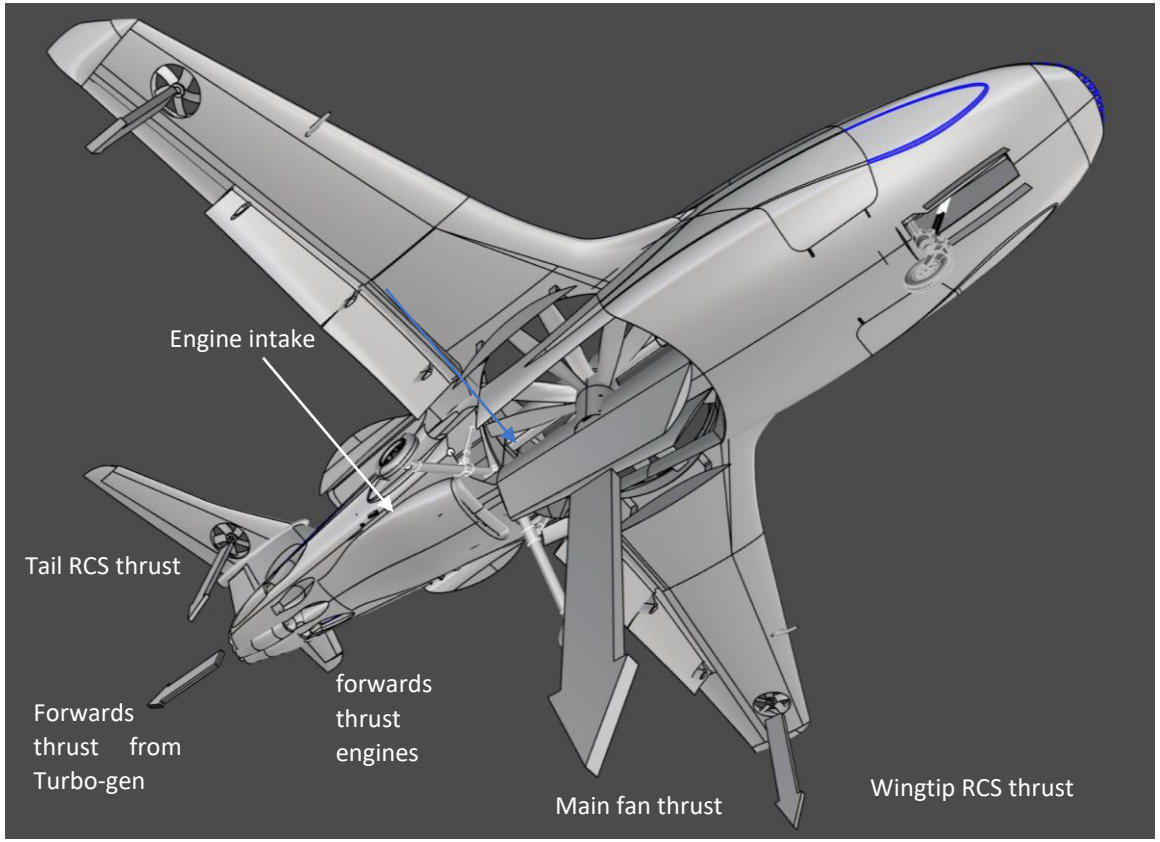
Designing an aircraft to look good is one thing, but to then endow it with VTOL capability has taken some serious innovation.

While e-VTOLs may be functional, most have neither performance nor style, as VTOL capability conflicts with performance, forcing uncomfortable compromises:

Q-starling however finds innovative solutions to each of these design challenges. The result; a purposeful private “jet fighter”, the ultimate status symbol that can land anywhere; a vehicle that could easily imagine “Q” wearlily uttering “*now pay attention 007*…”



The art of the hover



Q-Starling hovers using the thrust of a single large diameter fan, while the "Reaction Control System" (RCS) fans in the wing and tailplane maintain control and balance.

The RCS responds to controls from the pilot via the fly-by-wire system to ensure the critical phases of transition to and from wingborne flight remain within the safety envelope.

Transition assisted by a stability augmentation system, but it is always the pilot who is in control. The key interface is a single side-stick controller which allows the pilot to command all 3 axes of rotation, as well as vertical and forwards movement. This system will be so simple to fly that pilots will need only 10 hours of extra instruction beyond standard PPL training.

Propulsion

Q-Starling does its bit to save the planet. Propulsion is Hybrid-electric, with turbo-generators running on bio-diesel/SAF backed up by batteries during the power hungry take-off and landing.

The turbo-generator is lighter than a conventional turbo-shaft, with its heavy gearbox and exhaust splitter. The turbo-generator then becomes a turbo-jet in conventional flight.

This unique combination provides amazing performance that matches any of its non-VTOL peers.

Q-starling in flight

Q-Starling can be flown by pilots with a modified PPL qualification. VTOL however presents some unique challenges which are addressed by a combination of training and flight control management.

On approach, VTOL controls kick in at just above stall speed; this activates the RCS. The main fan doors open, the flaps deploy, the landing gear lowers and the fan begins to power up and starts off-loading the wing.

The flight path remains under pilot control, but stability and power settings are automatically adjusted in accordance with pilot demand.

The FCS also manages the emergency scenarios. As a last resort, **Q-Starling** is also fitted with a ballistic recovery chute, which is able to operate down to zero speed/zero altitude.

Cockpit Ergonomics

The cockpit is a mix of high performance sports car and fast jet. The “sidestick” provides intuitive commands to control all of the desired motions of the aircraft, (even replacing the traditional rudder pedals).

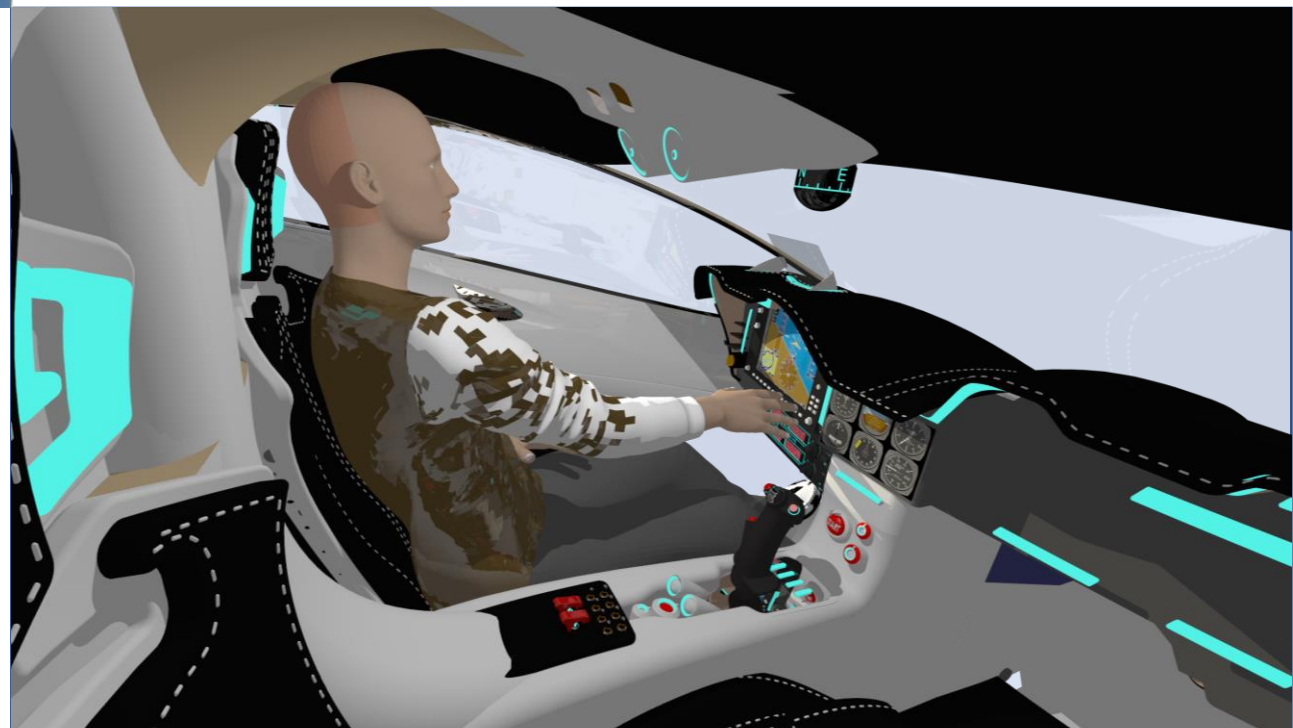
The cockpit has been designed to the highest automotive standards of comfort and style while considering the practical issues of pilot vision in all modes of flight. **Q-Starling’s** ability to land and take-off vertically means that downward visibility is a key requirement. Additional glazed panels are provided, and these are augmented with synthetic vision aids in the cockpit.

Structure

Q-Starling uses the very latest thin-ply technology carbon fibre materials throughout. The endow ultra-light and stiff structures that minimise the weight overheads of carrying a large lift fan.

The wing is sized to perform semi-aerobatic manoeuvres and will also house the main (green) fuel tanks. The laminar flow aerofoil sections will also enable that fuel to go further.

Limited production will mean that each aircraft will be hand built and finished.



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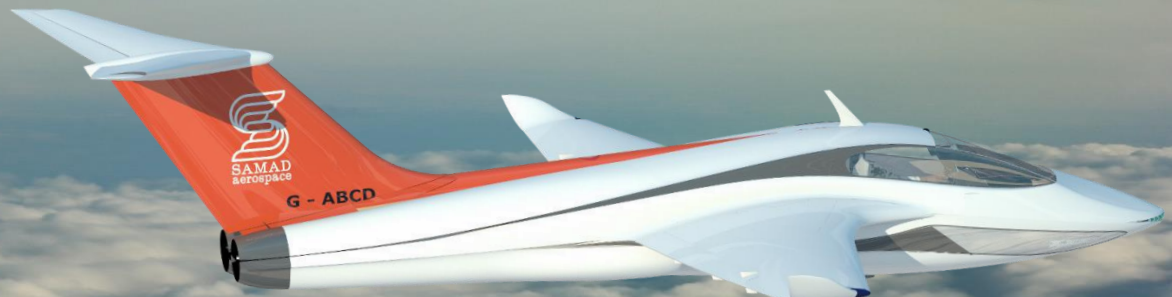
Specification:

Pilot	1
Passengers	1
Length	8.08 m
Wing span	7.92 m
Wing area	87 m^2
Aerofoil section	LS-413
Max TO weight	1,040kg (2,300lb)
Service ceiling	15,000ft
Cruise speed	250kt (300mph)
Max speed	300kt (360mph)
Stall speed (full flaps)	65kt
Range	500 miles
Powerplant: 2 x modified PBS TS100 turboshafts	
Max power	180kW (241hp)
Max cont power	160 kW
Avionics	Honeywell (TBC)

Qstarling



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