

Rise of the robocopters

It's no surprise that the entry of players like Airbus, Sikorsky and Robinson into the UAV space has garnered a good deal of attention in the first half of the year. Even so, there is much to consider in the sub-full-size UAV space, as Anil Pustam discovers.

Unmanned rotorcraft are beginning to enter service, albeit still in small numbers, but for significant roles. How valuable are they – or could they be – in rotorcraft operations?

Unmanned helicopter manufacturer Schiebel's Global Head of Sales, Neil Hunter, indicates that a lot of the cost of the manned helicopter is due to the need for pilot safety and the provision of room for the pilot. He tells *RotorHub International* the unmanned helicopter is "as efficient as you can get, as cost-effective as you can get".

Aliaksei Stratsilatau, CEO of UAVOS, referencing the company's conversion of a Robinson R22 helicopter to an unmanned configuration, provides a view which, when generalised, is complementary.

By removing the "human interfaces", the company removed a lot of weight. By replacing this with fuel, the aircraft's range increased "dramatically".

He adds: "The removal of the human pilot made the helicopter more reliable."

Stratsilatau also alludes to the fact that the human could get tired, could forget. So safety too is increased.

Here, *RotorHub International* gets an insight from Schiebel, UAVOS and other unmanned rotorcraft manufacturers on their aircraft' conceptualisation and development, roles and further evolution.

Emerging market

Of the manufacturers interviewed, Schiebel (Austria) and UAVOS (USA) have kept to the standard civil rotorcraft

configuration, namely the helicopter. So has SwissDrones.

Another two manufacturers are developing, though unlike the above three not yet producing, service-ready aircraft in which the propulsive force transitions between the full provision of lift (upward-facing) and the full provision of thrust (forward-facing).

Out of Schiebel, UAVOS and SwissDrones, the first to produce saleable unmanned rotorcraft – and the first to get an aircraft in service – is Schiebel.

The aircraft in question is the S-100, with a payload of more than 50 kilograms.

Hunter notes that the S-100, on first entering service with the UAE military in the early 2000s, was "one of the first unmanned helicopters" in the world.

The UAVOS UVH-150.
Image: UAVOS





With a payload of up to 33 kilograms, SwissDrones' SDO-50 makes use of Flettner's intermeshing double rotors. Image: SwissDrones

He says that in the beginning “the market was 70 to 80 per cent military, the rest commercial”, adding: “It was easier to sell to the military. The commercial world was much slower to open up.”

The second manufacturer of the three to produce saleable unmanned rotorcraft is SwissDrones. Its aircraft, the SDO-50, with a payload of up to 33 kilograms, entered service in the early 2010s.

At that time, the company “saw the potential for commercial applications”, says Arangan Varatharajah, SwissDrones' Head of Flight Operations and Training. But even then, “all the early customers were not really commercial”, being rather of the experimental/government/university type.

By the late 2010s, however, the commercial market was becoming apparent. Bristow, the provider of search and rescue in the UK, acquired two

Schiebel S-100s in 2019.

In this period the third manufacturer, UAVOS, began producing unmanned helicopters. These are of three types, the most capable of which is the UVH 500, with a 140-kilogram maximum payload.

Design optimisation

Unmanned helicopters are more than manned helicopters without an onboard flight crew. They may be further optimised according to the role(s) focused on. A component that could be so optimised is the propulsion system.

Schiebel's S-100 has an usual engine type, the Wankel. Hunter says the engine has “a good power to weight ratio and very low vibration”. He notes that two- and four-stroke piston engines have a lot of vibration, and a lot of damping must be put into the camera software to get rid of it.

Further, SwissDrones' SDO-50 has the unusual Flettner intermeshing double

rotors. Varatharajah says this improves the stability of the aircraft and allows it to carry more payload, sensors.

Again, UAVOS's first unmanned helicopter, the UVH 25EL, was electric-powered. Its payload was just five kilograms, with an operational range of 67 kilometres, but the aircraft was “simple”.

For the more capable UVH-170, with a maximum payload of 15 kilograms and a practical range of 350 kilometres, and the 140 kilograms maximum payload UVH-500, with a range of 100 kilometres though, the company opted for piston engines.

Maritime orientation

The military S-100 has had a maritime orientation, and this has also been reflected in the civil customers. Its search and rescue (SAR) role with Bristow has a maritime aspect.

The role is one for which the aircraft's



The Schiebel S-100.
Image: Schiebel

high endurance well suits it.

Hunter says the S-100 could fly in a search pattern for four to six hours. Then when a person needing to be rescued is found, a manned helicopter could be launched.

Another long-standing maritime-related S-100 role is with the European Maritime Safety Agency (EMSA).

Schiebel is currently operating under its third contract with the organisation for the provision of emission monitoring and maritime surveillance with the S-100.

The first contract was in 2018, the second in 2021. The current contract is to continue until next year but could be extended for a further two years.

These contracts have seen the S-100 operate in Croatia, France, Finland, Denmark, Spain, Estonia, Romania, Lithuania, Iceland, Germany and

Belgium. It has been based on land or on ships, performing night/day maritime surveillance, SAR and oil spill detection.

It also has another, unusual role which is perhaps most eminently suited to an unmanned helicopter and least suited to other means – the monitoring of the sulphur content of ships' emissions to ensure compliance with environmental requirements.

Police aviation

The UK National Police Air Service (NPAS) has been using the S-100 to evaluate the feasibility of operating unmanned aircraft alongside manned police helicopters and fixed-wing aircraft.

The NPAS has 19 helicopters and four fixed-wing aircraft and receives around 100 service calls per day.

It is interested in finding out if advances in aircraft technology could improve policing operations – more specifically, their flexibility – and if so, how to safely introduce them.

Prior to the S-100 evaluation, the UK police had only used unmanned aircraft

of the small quadcopter type.

The UK's National Air Traffic Control Service (NATS) has also been involved in the evaluation, with detect-and-avoid techniques being important to ensuring that public and other airspace users were not disrupted.

The S-100 used has a Wescam MX-10, which Hunter calls "a very good camera". With the MX-10's infrared sensor, they were able to detect from the air what teams on the ground could not.

Hunter says the camera has a "good slant angle", adding that the S-100 doesn't necessarily need to fly over cities.

Noting that the search for people is usually in rural areas, he says that with an appropriate sensor it could locate mobile phones from aircraft and so find missing people.

Civil focus

Fifty-two SDO-50s have been delivered to customers, all civil, in 15 countries across six continents.

The aircraft has been approved for beyond visual line of sight (BVLOS) flight in 36 countries, including by the European Union Aviation Safety Agency

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Neil Hunter, Global Head of Sales, Schiebel

(EASA). The current model is the V3, which was introduced in 2022, with the V2 being the previous operational model and the V1 the prototype.

The highest number of flight hours has been achieved by Explore in Australia. The company uses two SDO-50s to inspect 550 kilometres of gas pipeline in the country every quarter. This was previously done by helicopter.

Explore appreciates the aircraft's endurance (up to three hours); range (more than 100 kilometres); payload, which could simultaneously include advanced cameras, LIDAR capability, thermal sensors and safety equipment; detect-and-avoid technology, in the form of the TSO ADS-B transponder (Mode S); redundant systems; and encrypted data link options.

SwissDrones' latest announced sale is for an aircraft to Sanwa Gikou in Japan

for aerial surveillance, SAR, infrastructure inspection and monitoring, emergency transport and natural disaster support.

The next generation

What are the future-oriented developments underway at the companies?

Schiebel has a new-generation unmanned helicopter, the S-300.

Having first flown in the last quarter of 2025, the aircraft is now flying "more and more", in testing and evaluation.

Flights have taken place in Austria and Bordeaux, France, and off Portugal – including to an altitude of 15,000 feet at a "descent" distance.

According to Hunter, the S-300 might be able to fly for more than 20 hours (on full tanks), while its greater payload capability could allow carriage

of the MX-50 camera and a "proper" maritime radar.

The first production aircraft are due to be delivered to South Korea (military) by the end of the year.

Meanwhile, SwissDrones has been evaluating satellite communication fits in the SDO-50.

Varatharajah says such a system "opens new possibilities to operate aircraft in dangerous areas [and] is a game changer for drone operators".

Otherwise the company is "trying to find common ground" with regulators and "is in constant contact with EASA".

Varatharajah says: "Regulations are very different from traditional ones [regarding manned aviation] but are evolving to that. They have to ensure their aircraft comply with future regulations."

But he notes that they could "only do

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so much change without changing the product itself”, adding that they “might need to look into building something from the ground up to comply with regulations and comply with the latest technology”.

According to Stratsilatau, UAVOS could be interested in “safer software, better autonomy, safer operations, some AI-assisted operations, the linking of unmanned aircraft with air traffic control, some cloud-based common sensors, some predictive maintenance, which might be AI-driven or cloud-based”.

Transitioning aircraft

Of the two manufacturers developing transitioning aircraft, the first (by prototype first flight) is PteroDynamics (USA).

Jason Maddocks, the company’s VP of Programmes, says that the need was recognised “for an aircraft that could take-off and land vertically, operate without a runway, then fly over long distances efficiently”. The problem was approached from “a first principles perspective.”

The World War Two-era Grumman Avenger and birds were wing-folding inspirations. The first resulting Transwing aircraft had two hinges in the wing. Later aircraft had one.

Maddocks notes that the Transwing “transitions very quickly, like a bird”.

The Transwing first flew in 2017, though the first three aircraft only had a small number of flights. The fourth,

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Sascha Hardegger, CEO, Dufour Aerospace

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Aragan Varantharajah, Head of Flight Operations and Training, SwissDrones

the P4, which was first flown in 2022, had the majority.

About 1,100 flights have been made in total, encompassing around 550 hours.

The scaled-up fifth aircraft (P5) could fly by the end of June.

In the Transwing, propulsors on the wing face upward when the wing is folded. They provide lift. When the wing is extended (unhinged) the propulsors face forward. They then provide thrust, with the wing providing the necessary lift.

The P4 is all-electric, with two electric motors on each wing, while the P5 is serial hybrid, with three electric motors on each wing.

Maddocks expects a range for the P5 of at least 800 nautical miles (1,480 kilometres) with a small payload and endurance of 15 hours with a small payload. Payload could be a maximum of 80 pounds (40 kilograms) over a shorter distance.

He quotes a US Navy study in which it is shown that 90% of critical cargo weighs 50 pounds (20 kilograms) or less.

Maddocks says PteroDynamics is “focusing on high-value cargo to hard-to-reach locations where time is of the essence”.

The company’s internal studies show that cost per flight hour for the Transwing configuration is significantly less than that for helicopters.

Tilt wing

The second transitioning aircraft manufacturer is Dufour Aerospace of Switzerland.

Its aircraft, the Aero-200, is of tilt-wing configuration. This promises long-range capability and long-range efficiency.

According to CEO Sascha Hardegger, the company was inspired by the Canadair CL-84 and LTV XC-142.

But Hardegger says these aircraft were mechanically complex, not having modern controls and modern electrical propulsion systems. And they had vibration issues, which could be resolved by today’s controls and propulsion systems.

The Aero-200 has four propellers, which Hardegger says are “mechanically much less complex than rotors”. He adds that in the tilt-wing configuration, “the propellers remain stable with respect to the wing”.

The propulsion system is serial hybrid, comprising electric motors and a combustion-engine range extender. This arrangement provides “more redundancy”.

The first flight was around the turn of the decade, but the aircraft has “evolved quite a lot” since then. It is “a totally different aircraft”.

There have been seven different prototypes, encompassing four generations, the fourth being the current one. The latest first flight was in 2025.

A major technical challenge was implementing a full autopilot on a tilt-wing aircraft. There were not “a lot of people with specific knowledge” of that.

The aircraft took “a lot of time and effort to build”, says Hardegger, adding that: “The structure evolved, aerodynamic design evolved, propulsion system evolved, propeller design evolved – almost everything evolved.”

Hardegger notes that compared to unmanned helicopters, the tilt-wing has “a clear advantage of efficiency in cruise flight”, with the brochure figures specifying a useful load of 38 kilograms, a typical mission load of 20 kilograms and a range of 200 kilometres. ■