

Unmanned whirlybirds: Rotary-wing UAVs take off in Asia

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Rotary-wing UAVs have been gaining traction in the Asia-Pacific region, particularly in the maritime domain where naval forces are building ships with an eye on unmanned aviation capabilities. Land forces operating in constricted terrain are also investigating similar systems. *Kelvin Wong reports*

The adoption of unmanned aerial vehicles (UAVs) continues to increase for Asia-Pacific defence forces as they come to realise the benefits such platforms can potentially offer – especially increased intelligence, surveillance, and reconnaissance (ISR) capabilities – at more affordable costs and lower logistical footprints than conventional aircraft.

Rotary-wing vertical take-off and landing (VTOL) UAVs are gaining traction with regional forces for their ability to operate without the need for a runway or complex launch and recovery systems, capturing the attention of a market that is hungry for the advantages that such UAVs can bring.

Regional armies tasked to operate in dense jungle or austere environments appreciate the airborne ISR that VTOL UAVs can provide at short notice, with an eye on potential close air support (CAS) applications with armed platforms as the technologies mature. For resource-strapped regional navies, VTOL UAVs represent more cost-effective alternatives to manned naval helicopters, bringing new capabilities for existing and newbuild vessels that are being tasked with an ever-widening mission set.

AVIC AV500W

The Aviation Industry Corporation of China's (AVIC's) China Helicopter Research and Development Institute (CHRD) has developed the AV500W VTOL UAV, a weaponised variant of the civilian model AV500 modified for military applications with improved structural robustness, payload capacity, and overall performance.

According to company specifications, the AV500W – first unveiled to the public at the Airshow China 2016 exhibition – has a maximum take-off weight (MTOW) of 470 kg with a payload capacity of 160 kg. This typically comprises a chin-mounted, stabilised electro-optical/infrared (EO/IR) sensor turret to enable the vehicle to perform day/night reconnaissance, battle damage assessment (BDA), as well as target detection and tracking. Other electronic payloads such as synthetic aperture radar (SAR) and communications relay devices can be carried internally.

Stub wings on either side of its fuselage can be configured to carry a range of weapons. *Jane's* understands that the company is developing a range of weapons designed specifically for rotary-wing UAVs, including 6 kg- and 10 kg-class precision-guided bombs that can engage static or slow-moving targets up to 5 km via semi-active laser (SAL) guidance.



The AV500W is the weaponised variant of the civilian model AV-500 VTOL UAV designed specifically for ground support missions. (IHS Markit/Kelvin Wong)

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Although the company declined to provide details on the propulsion system, it stated that the AV500W features a cruising speed of 170 km/h, with a maximum endurance of 8 hours when configured and lightly loaded for reconnaissance missions. This is reduced to 4 hours when the air vehicle is fully armed. The air vehicle was earlier specified to offer an operating radius of 200 km via line-of-sight (LOS) command protocols, with a service ceiling of 13,123 ft (4,000 m).

AVIC appears to have further enhanced the air vehicle's flight envelope. State media reported in November 2017 – citing an announcement by the Jiangxi Provincial Office of Science, Technology, and Industry for National Defense – that the AW500W performed firing trials in Qinghai at 14,107 ft above sea level, and climbed to an altitude of 16,423 ft, the highest achieved by a Chinese-made VTOL UAV.

AVIC earlier revealed that the baseline AW500 had undergone trials off Nan'ao Island in the Guangdong province in April 2016. According to the company, the air vehicle is capable of performing automatic take-off and landing manoeuvres from the helicopter deck of a civilian maritime patrol ship in wind conditions of up to 10 m/s, while being able to operate normally in 17 m/s winds.

Meanwhile, the privately owned Beijing Zhonghangzi Technology (BZT) has developed a family of multirole co-axial rotor VTOL UAVs for civilian and military applications, although the company is aiming to gain a foothold in the logistics market with its large payload-carrying abilities.

The company introduced the TD220 and T333 platforms in 2016. The TD220 is 2.5 m long, 0.5 m wide, and 1.8 m high, with a rotor diameter of 4 m. The air vehicle has a MTOW of 300 kg and can carry a maximum payload of 100 kg along with 50 litres of fuel, which enables it to stay aloft for up to 5 hours. A gasoline engine of undisclosed type enables it to attain a maximum speed of 100 km/h and a ceiling of just over 13,000 ft, while its operational radius extends to 100 km.

In contrast, the T333 has a MTOW of 3,000 kg with a length, width, and height of 5.4 m, 3.3 m, and 3.325 m, respectively, and features a rotor diameter of 11.5 m. The larger platform has an operational radius in excess of 400 km and can carry up to 1,500 kg in stores, although endurance can be extended to 30 hours with a 200 kg payload. Maximum speed is 300 km/h.

“We opted for the co-axial rotor arrangement to remove the need for a tail rotor, which in turn reduces the length of the airframe and also the dangers of inadvertent damage to it and to reduce overall footprint for improved transportability and ease of storage,” a company spokesperson told *Jane's* .

“Our proprietary rotor and gearbox design ensures that power from the engine is maximised for vertical lift, with minimal power wasted on preventing the UAV from spinning in reaction to rotor rotation,” he added, noting that the company has also designed these components to be as simple and robust as technically feasible to reduce maintenance requirements, which are typically higher on co-axial rotor designs.

SU-H2M

In contrast, Sunic-Ocean System Tech (Sunic-Ocean), a Qingdao-based research and development (R&D) company specialising in UAVs and autonomous flight control systems, has developed the maritime-oriented SU-H2M VTOL UAV, which adopts a more conventional airframe construction.

The SU-H2M features a 3.81 m-long tadpole-shaped fuselage with a skid undercarriage that carries a two-bladed carbon fibre main rotor with a diameter of 3.2 m. A two-bladed tail rotor is fitted on dorsal and ventral swept vertical tail surfaces towards the rear.

According to Sunic-Ocean specifications, the SU-H2M has a MTOW of 110 kg and is powered by a water-cooled four-stroke 34hp rotary engine. This configuration enables the air vehicle to carry a 10-litre fuel tank along with a 35 kg payload.

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