

New high altitude stealth drones by US and China for surveillance of South & East China Sea

The disruptive revolution in the use and employment of robotic and autonomous systems on the future battlefields is continuing with development of new drones which are stealthy, faster, high altitude, long endurance and highly autonomous.

China is already world's largest producer of UAVs and is working on taking on a greater share in the military drone segment of the global market, competing against traditional leaders like the US and Israel. China is becoming leading Exporter of Armed Drones, Chinese drones such as the CH-3 and CH-4 have been employed by Chinese air force as well been proliferated to a wide range of Militaries from Myanmar, Saudi Arabia, the United Arab Emirates, Egypt to Pakistan, Nigeria, and Iraq.

China is building five models of large-sized unmanned aerial vehicles (UAVs) for various military work and applications, Duowei News, a U.S.-based Chinese news resource, said. A research conducted by Duowei has revealed that China is developing five UAVs: the "Sharp Sword," a combat drone; the "Soar Dragon," a high altitude long endurance (HALE) drone; the "Condor" drone series; the "Sky Wing 3"; and the "Long Eagle" HALE drone.

China's defence strategy, calls for increasing the range of its military forces further from its own coasts through what the Chinese call two island chains, stretching from northeast Asia through the South China Sea. China calls its military strategy of "active defense," a combination of strategic

defense, self-defense, operational and tactical offense, and a willingness to counterattack. Chinese military's primary aim is to prepare itself to fight "local wars under conditions of informationization"—in other words, regional conflicts in which command, control, communications, intelligence, reconnaissance, and surveillance (C4ISR) would play major roles.

Heavily armed CASC CH-5 UAV makes public debut

China Aerospace Science and Technology Corporation (CASC) has successfully integrated and launched a new precision guided missile (PGM) on its Cai Hong 5 (Rainbow 5, or CH-5) strike-capable, medium-altitude long-endurance unmanned aerial vehicle (MALE UAV). The new 80 kg-class PGM AR-2 – carrying a blast fragmentation warhead – was tested via lock-on before launch (LOBL) targeting protocols from a production-model CH-5 at a launch altitude of 11,482 ft.

Company sources also revealed to Jane's that the 45 kg-class AR-1 semi-active laser (SAL) anti-armour missile was successfully integrated and certified for delivery aboard the CH-5 in August. According to official specifications, the AR-1 employs inertial navigation system (INS) as well as SAL guidance to engage armoured targets or buildings up to 8 km away, with a 10 kg blast fragmentation or penetration warhead travelling at a maximum speed of Mach 1.1. It also features LOBL and lock-on after launch (LOAL) capabilities. Accuracy is claimed to be 1.5 m circular error probable (CEP) when engaging targets at maximum range.

The AR-2 is essentially a lighter and less capable variant of the AR-1, but is more cost-effective and can therefore be expended more readily, saving the heavier missile for higher value targets. It is armed with a 5 kg penetration warhead and operates at similar ranges but travels at a maximum speed of

around 700 km/h.

China Aerospace Science and Technology Corporation (CASC) showcased its latest and most capable armed reconnaissance UAV Designated Cai Hong 5 (Rainbow 5, or CH-5), in Airshow China 2016, held in Zhuhai from 1-6 November. CH5 had its maiden flight in August 2015.

The medium-altitude long-endurance (MALE) CH-5 features a lightweight all-composite airframe structure that is 11 m long and has a wingspan of 21 m. The air vehicle has a maximum take-off weight (MTOW) of 3,300 kg and can carry a 1,200 kg payload. With an internal mission bay capacity of 200 kg and the remainder provisioned for underwing stores, it can carry as many as 16 air-to-ground weapons.

Typical payloads include a chin-mounted EO/IR sensor turret with a high-definition daylight CCD TV camera, a thermal imager as well as a laser rangefinder/designator. Internally carried mission payloads can include a range of electronic warfare (EW) systems, such as radio frequency communication disruptors or signals exploitation equipment, or even additional sensors such as a synthetic aperture radar (SAR) for improved air-to-ground intelligence gathering.

CASC has specified an operating range of up to 250 km via line-of-sight datalink, although this can be extended to 2,000 km when satellite communication (SATCOM) protocols are employed. It is also capable of autonomous flight using pre-programmed waypoint navigation, with taxiing, take-off, and landing manoeuvres also fully automated.

According to Kelvin Wong, Zhuhai, China – IHS Jane's International Defence Review, CH-5 is equipped with a 330 hp heavy-fuel engine (HFE) that provides it with an operating endurance of up to 60 hours with high reliability, although this can be substituted with a 300 hp gasoline engine that offers up to 39 hours of endurance. Yan added that the HFE

option enables the CH-5 to achieve a loiter speed of 180-220 km/h and a maximum speed in excess of 300 km/h, with a service ceiling of 30,000 ft (7,000 m).

Xianglong, or (Soar Dragon), high-altitude, long-endurance drones

After over 10 years of development, China's Xianglong (Soar Dragon) High-Altitude, Long-Endurance (HALE) aerial drones are about to enter service with the People's Liberation Army (PLA). An unknown number of Xianglong, or Soar Dragon, high-altitude, long-endurance drones have been produced by Guizhou Aviation Industry Group, which is part of the State-owned aircraft maker Aviation Industry Corp of China, according to aviation sources.

According to AirForces Monthly, a British military aviation magazine, Xianglong has a cruise speed of 750 kilometers per hour and a flight range of 7,000 km. Xianglong has an estimated maximum takeoff weight of some 12 tons. It is capable of operating for 10 hours and can fly up to an altitude of 18,000 meters, the magazine said. It is likely to become China's answer to the United States' Northrop Grumman RQ-4 Global Hawk, considered to be the most well-known unpiloted surveillance drone in the world.

The wings of the Xianglong are very distinctive, with a swept forward wing behind and higher than the main conventional swept back wing. The tips of the aft wing are joined to the main wing about half-way along its span, creating a highly recognisable diamond shape when viewed from above or below, reports IHS Jane. This increases its flight endurance and high altitude performance by reducing wingtip drag.

"Xianglong's unique design makes it suitable for long operations at high altitude. Once the drone is commissioned to the military, it will boost the PLA's long-range

reconnaissance capabilities,” said Wang Ya’nan, editor-in-chief of Aerospace Knowledge magazine. The operational Xianglong is likely to be used for maritime surveillance of foreign bases and warships, as part of the anti-access/area denial kill chain.

One source, however, said Xianglong will be armed with missiles and smart bombs. In wartime, Xianglong’s jammers will jam radars of enemy fighters and missiles. “Moreover, the jet is a good platform for electronic warfare operations such as signal intelligence collection and electronic jamming,” he added. Chinese engineers have noted that the Xianglong’s large payload, endurance and range makes it ideal for electronic warfare (EW) missions, both for gathering intelligence on electronic activity, as well as carrying jammers to disrupt enemy radars and datalinks.

Project 973 or Shen Diao (“Divine Eagle”) high-altitude, long-endurance (HALE) multi-mission platform

China has unveiled its latest platform for C4ISR, Shenyang Aircraft Corporation’s Project 973 or Shen Diao (“Divine Eagle”) prototype. This new large twin-fuselage turbofan-powered unmanned aerial vehicle (UAV) could serve as a new high-altitude, long-endurance (HALE) multi-mission platform for conducting surveillance, cueing, and communication missions. The latest Divine Eagle iteration is less stealthy, having two satellite communications domes, completely vertical tails and an exposed engine intake.

Popular Science describes the Eagle at about 6 meters tall, and 15 meters long (since most high altitude large UAVs have a wingspan to body length ratio of 2.5:1 to 3:1, the wingspan of the Divine Eagle is likely its be 35 to 45 meters across). With a maximum take off weight of at least 15 tons, the Divine

Eagle is the world's largest UAV, edging out the RQ-4 Global Hawk. The two photos and descriptions appear in Popular Science and provided by Chinese Media.

For more information about divine eagle: <http://idstch.com/home5/international-defence-security-and-technology/military/air-231/pla-s-new-high-altitude-long-endurance-counter-stealth-drone-enhances-its-a2-ad-capability/>

China's Sharp Sword (Lijian) Unmanned combat aerial vehicle (UCAV)

The Sharp Sword is the first non-NATO stealthy unmanned combat aerial vehicle (UCAV). Duowei said that the Sharp Sword, a variation of the AVIC 601-S series, was being jointly developed by the Aviation Industry Corporation of China, Shenyang Aerospace University and Hongdu Aviation Industry Group.

Its engine is a non after burning WS-13 turbofan engine, with serpentine inlet to hide the engine from enemy radars. The drone has length of about 33 feet, and a wingspan of about 46 feet.

Looking a bit like a mini-B-2 flying wing bomber, the UCAV has two internal bomb bays and a likely payload of about 4,400 pounds. Stealthy UCAVs have a number of advantages over their manned counterparts: Freed from the constraints of accommodating pilot, they can carry more payload onto a same airframe, and have much longer ranges.

Similar to the U.S. X-47B UAV developed by Northrop Grumman, the Sharp Sword is made from tungsten and other composite materials and has strong stealth and combat capabilities. The research said that the drone can be used for long-range reconnaissance, but can also be deployed for military missions, such as combat, rescue operations and anti-piracy

and anti-terrorism missions.

The drone had a 20-minute maiden flight in southwestern China in Nov. 2013. According to Internet reports a second, even stealthier Sharp Sword began flying last year (with a stealthy engine). If flight testing with the prototypes goes as well as the initial flight tests did with the first airframe, the Sharp Sword could enter service as early as 2019-2020

The “Shendiao” of No. 601 Research Institute

China has developed – a high altitude, long-range, anti-stealth drone- the “Shendiao” a double-fuselage drone that will give the People’s Liberation Army long-range surveillance and strike capabilities.

According to a book titled Going Straight Forward: China needed to develop small multifunctional cheap early warning aircraft that are connected to a network and easy to use, as China was lacking in this area.

The Shendiao is an ideal drone to serve as radar sensors for a manned early warning aircraft. A group of Shendiaos can form a multi-based radar system, operating with a manned early warning aircraft.

No. 601 Research Institute has achieved this goal, and has developed an experimental “Shendiao” drone based on the international cooperation.

Chengdu Aircraft Corp Tian Yi

China’s Chengdu Aircraft Corp. had earlier unveiled its latest iteration of the Tian Yi, high-altitude, long-endurance drone that could have stealth capabilities.

The new modified version is about the same size as the original Tian Yi, but has a redesigned fuselage. The most prominent difference is a wider empennage that incorporates two smaller turbofan engines plus a wider air intake. These modifications are most likely intended to suppress the UAV's infrared signature, which would stand out against in high cruise altitudes, according to IHS Jane's 360.

Northrop Grumman RQ-180

Northrop Grumman, funded through the Air Force's classified budget has developed a new stealth drone RQ-180, that flies higher (60,000 feet) and has longer endurance of up to 100 hours through in-flight refueling for long-range reconnaissance missions. It is expected that the RQ-180 will be able to fly at speeds up to Mach 3.

RQ-180 has a flying wing design with approximately 130-foot-wingspan, similar in shape and size to the B-2 stealth bomber, another Northrop project. The lack of vertical stabilizers features makes the configuration inherently unstable, so the craft have to adjust continuously via wing-mounted control surfaces.

However longer wingspan allows engineers to place control surfaces farther out on the wing, where smaller adjustments are required to move the plane. This, in turn, means that the control surfaces can be much smaller, so they won't catch radar, said Eric Adams in January 2015 issue of Popular Science.

The drone can be manually controlled or sent on preprogrammed routes. RQ-180 is fit with the automatic launch and recovery system (ALR) which enables her to land in without crashing if the command connection between the ground station and the drone fails.

The plane is equipped with active, electronically scanned array (AESA) radar and passive electronic surveillance measures, and believed to be capable of electronic attack missions, as reported by Aviation week.

“The RQ-180 is a major step toward combining endurance and survivability in a high-end unmanned aerial vehicle. In addition to reconnaissance, it will . . . execute electronic attacks and penetrate well-defended areas where nonstealthy craft are problematic.” Said Loren Thompson, military analyst at the Lexington Institute

Speaking at an aerospace industry event in Virginia on June 9, Air Force surveillance chief Lt. Gen. Bob Otto said the RQ-180 would give the Pentagon “better access to contested airspace,” The RQ-180 is expected to enter operation in 2015, and will be a joint tool for both the US Air Force and the Central Intelligence Agency, says Aviation Week.

The article sources also include:

<http://en.yibada.com/articles/48236/20150725/china-five-large-sized-drones-military-applications.htm>

<http://www.popsci.com/soar-eagle-chinas-coolest-looking-drone-enters-production>

<https://www.sofmag.com/a-chinas-divine-eagle-drone-the-worlds-biggest-uav/>

<http://www.janes.com/article/66431/china-s-xianglong-hale-uav-to-enter-service-shortly-says-report>

<http://www.popsci.com/china-sharp-sword-lijian-stealth-drone>

https://janes.ihs.com/Janes/Display/FG_648783-IDR