

AERO INDIA 2021

HAL puts on show lethal new warfighting systems

AIN SHUKLA
Yelahanka, Bengaluru, 4 February

Departing from the public sector tradition of imaginative and shabby exhibition displays, Hindustan Aeronautics Ltd (HAL) is enthralling the attendees of Aero India 2021 with a glitzy, laser-lit, full-scale mock-up that shows how the Indian Air Force (IAF) will fight the wars of the future.

The highlight of HAL's display is the Combat Air Teaming System (CATS), a combination of manned and unmanned systems that will operate in wartime in tandem, reinforcing each other's strengths and compensating for the other's vulnerabilities.

This new concept moves on from the current practice of groups of manned fighter aircraft entering enemy airspace and, with each one essentially fighting as an isolated platform, shooting down enemy fighter aircraft and bombing ground targets.

CATS does not send pilots into enemy airspace, where they risk being shot down, captured or held hostage, thereby taking a purely military operation into the political realm. Instead, it envisions manned aircraft functioning as airborne controllers of lethal, unmanned vehicles that swarm in numbers into enemy airspace and overwhelm their defences.

The concept, which has multiple components, was presented by HAL to the IAF at the end of 2019. It interested the air marshals enough for them to request an oversight role in the project, with the first step being the development of a "proof of concept", or an initial working prototype.

While the IAF may offer to fund the project at a later stage, for now HAL is funding it with its internal resources.

The heart of the entire system is a "mother ship" called the CATS-MAX, based on a fighter like the Tejas LCA (light combat aircraft), which flies at altitudes as high as 45,000 feet, remaining inside our own airspace.



Rotary wing UAV

ALSO ON DISPLAY at the HAL booth is its new concept vehicle: a rotary wing, helicopter-type UAV that the army is interested in for delivering stores to high-altitude picquets at over 18,000 feet. "Currently this job is done by mules, or porters, or by air dropping, in which much of the payload is wasted since it misses the dropping zone. This is basically an airborne mule," explains a HAL designer. The design has already been completed and tenders are out for the engine and fuel system. HAL plans to involve the private sector closely, with all tenders issued by March 31. The air mule is slated to make its first flight by mid-2022.

unmanned combat air vehicles (UCAVs) called the CATS Warriors. Taking off and flying autonomously at altitudes of 36,000-40,000 feet, these are basically "loyal wingmen" that are armed with a variety of

weapons and sensors depending upon the mission.

The CATS-MAX could direct them, through a secure data link, to strike ground targets up to 350 km inside enemy territory, retaining the range to fly back a similar distance. Alternatively, the unmanned craft could be sent on a suicide mission 900-1,000 km deep, sacrificing themselves for the sake of range.

"The cost of each Warrior would be about 140 crore, which could be written off depending upon the importance of the mission," said HAL's design chief, Anup Chatterjee.

The Warrior prototype on display is a sleek vehicle, about the size of a Maruti 800 car. It is built with stealth design and Chatterjee is confident its low "radar cross section" would ensure it is not detected — or detected too late — by enemy radar.

The Warrior will be powered by an upgraded version of the engine that HAL has already developed — the PTAE-7 jet that is used to power the Lakshya target vehicle.

"The third component of the system is the CATS Hunter, which is basically a smaller Warrior and does most of the functions of a Warrior but is carried on the mother ship's wings. Once the mother ship reaches its launch point, the Hunter is released and flies out to distances of 200-300 km and execute their mission.

The fourth component is CATS ALFA, or Air Launched Flexible Assets. These are small drones that are carried on a glide pod and launched 200-300 km from the target. After gliding a long range, the glide pod dispenses a number of drones, which assume a swarm formation for a swarming attack on the eventual surface target.

The concept also visualises a CATS INFINITY high altitude, pseudo-satellite that can be launched as a control vehicle and stay aloft for up to three months. It is powered by solar energy and has huge wings to accommodate the solar panels.

Compatibility hit as services buy different kinds of radio

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Despite the appointment of a chief of defence staff (CDS) to coordinate procurement and interoperability between the army, navy and Indian Air Force (IAF), all three services are following different paths while buying their next-generation communication systems, known as "software defined radio" (SDR).

As a result, there will be a loss of communications efficiency when, say, an army signaller communicates with an air force pilot, defeating the very purpose of upgrading radio equipment. Even worse, the enemy could find it easy to intercept communications because of lower security protocols.

The IAF, which is ahead of the army and navy in buying futuristic SDR equipment, has chosen to equip its fighter aircraft, several kinds of transport aircraft, helicopters and ground stations with SDR developed by Israeli firm Rafael Advanced Defence Systems.

SDR is an entirely different kind of radio communication compared to current digital systems. The radio waveform is shaped by a secure software program that makes it difficult to hack and intercept. SDR allows for secure voice, data and video transmission and has been described flippantly as "a highly secure WhatsApp". In fact, it is far more sophisticated and secure.

In 2017, the IAF signed a contract worth over \$100 million with Rafael for 500 SDR sets that the Israeli firm has named the B-Net system. The next year, Rafael began integrating SDR sets into the IAF aircraft and ground stations where they were intended to be deployed.

Each different type of aircraft, base, radar and guided weapon need to be integrated

separately and tested and certified fit for use. That process is almost complete, says Eli Hefets, Rafael's corporate regional director for India.

Thereafter, the manufacture of the IAF's 500 SDR is to be carried out in Hyderabad in a joint venture (JV) company called Astra Rafael Composites (ARC). Indian electronics firm Astra Microwave owns a 51 per cent stake in ARC, while Rafael owns the remaining 49 per cent.

Hefets says Rafael has already placed an order worth about \$30 million on ARC, and that the JV is contractually bound to supply the IAF with SDR sets that were more than 80 per cent indigenous.

Meanwhile, the army has decided to procure SDR through the "Make 2" category of the Defence Procurement Procedure. This requires interested companies to develop equipment at their own cost and offer it to the MoD,

which then conducts trials and chooses what it likes. It is understood that the army will soon issue an expression of interest, inviting firms to develop suitable SDR.

Hefets says the JV firm, ARC, — the biggest user of portable, handheld radio — could end up with non-compatible equipment.

Meanwhile, the navy has decided to buy SDR from Bharat Electronics Ltd (BEL). Unlike aircraft, where space is critical, and unlike the army, where weight is crucial because many users have to carry their radio sets man-pack, naval vessels have ample space and no weight constraints for their SDR equipment. BEL's SDR equipment is both bulky and heavy, but meets the navy's requirement, perhaps at a lesser cost.

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FORM A PUBLIC ANNOUNCEMENT. (Under Regulation 8 of the Insolvency and Bankruptcy Board of India (Insolvency Resolution Process for Corporate Persons) Regulations, 2016). FOR THE ATTENTION OF THE CREDITORS OF SURYA EYE LTD. (IN CIRP RELIANT PARTNER)

ASPENKAP INFRA VADODARA PRIVATE LIMITED. Survey No. 26, Village Pipliya, Taluka: Wagholia District: Vadodra-391 790. Inviting Objections/suggestions on Petition of Aspenkap Infra Vadodara Private Limited for approval of Plan-up for FY 2019-20 & determination of revised Aggregate Revenue Requirement for FY 2021-22 and tariff for FY 2021-22 for its Distribution Business at Vadodra SEZ (Petition No.1034/2021)

FORM A PUBLIC ANNOUNCEMENT. (Under Regulation 8 of the Insolvency and Bankruptcy Board of India (Insolvency Resolution Process for Corporate Persons) Regulations, 2016). FOR THE ATTENTION OF THE CREDITORS OF MAHATI CONTROL & SYSTEMS PVT LTD.