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Indian Navy must expedite its carrierborne fighter programme



### Much Ado About Little

Aatmanirbhar abhiyan may not translate into efficient and modern technologies for the services



(L-R) Principal Deputy Assistant Secretary of Defense for Indo-Pacific Security Affairs Jedidiah P. Royal; U.S. Embassy New Delhi Chargé d'Affaires, a.i. Ambassador A. Elizabeth Jones; Major General Julian C. Cheater, Assistant Deputy Under Secretary of the Air Force, International Affairs; and Senior Defense Official and Defense Attaché Rear Admiral Michael Baker at a press conference in Bengaluru on the U.S. participation at Aero India 2023.

### We Are Friends

US puts it weight behind Aero India 2023; brings the largest delegation ever to the show

#### PRAVIN SAWHNEY | BENGALURU

India has emerged as the de-facto military ally of the United States with operational roles to support the May 2018 Indo-Pacific strategy. This was the unequivocal message given by the 'biggest ever defence delegation' to Aero India 2023 led by the US' Charge' d'Affaires Ambassador Elizabeth Jones.

Speaking with select media on the eve of Aero India, Jones said that both democracies support a 'free and open, rules-based Indo-Pacific' region. What was the threat to 'free and open' Indo Pacific, and who decided the 'rulesbased' order, was not explained by the US delegation. The closest response to this intriguing threat came from the Principal Deputy Assistant Secretary of Defence for Indo Pacific security affairs, Jedidiah P. Royal. According to him, for 75 years Indo Pacific has been a peaceful region; the US and India want to ensure it stays that way. On prodding, a rather exasperated Royal remarked to me that both you and I know what we are talking about.







### MiG-35

The MiG-35 multi-role fighter is designated to destroy aerial targets around-the-clock under clear and adverse weather conditions and to engage mobile and stationary ground (sea-surface) targets.

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The threat, which must not be spoken of is China. Chinese commercial trade, worth nearly USD four trillion passes annually through two prominent choke points--Strait of Hormuz and Strait of Malacca--covering 3,000 nautical miles across the Indian Ocean Region which India considered its backyard, until the PLA Navy (PLAN) started regular voyages starting 2018. The strategic congruence of the two nations is not that they are democracies, but that both are worried about China.

The US is in a global geopolitical competition with China with the Indian military supporting it. Few have asked what India gets from the unequal partnership with the US. Notwithstanding the troubled land and unstable disputed land border between India and China, India's Modi government believes that it too can, piggybacking on US' military power, be in a regional geopolitical competition with China. Since no nation can become a geostrategic power (nations with capability, capacity, and political will to influence events way beyond their borders) on borrowed military strength, especially when India is neither a military ally nor a non-NATO partner, India is embarked on a dangerous game.

This background explains both the presence of the massive US delegation at Aero India, as well as the genuflectory praise for the Prime Minister by defence minister Rajnath Singh during the inauguration. To complete the circle, India's presidency of the G-20 (a routine affair) drew appreciation from Jones and her colleagues.

Royal said that following the recent meeting between the two defence advisors on the Initiative on Critical and Emerging Technologies (ICET) in Washington, he was in India to finalise the 'defence technology roadmap' which will take the bilateral 'comprehensive global strategic partnership' to the higher level. According to him, the technology roadmap will 'include cyber, supply chains, semiconductors, space, bilateral startup relationship, and R&D in cutting edge projects.' He did not divulge any details, especially on how the US could help the Indian start-ups when the India-US tech gap was huge. Even the 2018 Innovation for Defence Excellence (iDEX) under the defence secretary has meagre financial allocations.

Meanwhile, when asked about the outcome of the 2016 US' label of 'Major Defense Partner' conferred on India, US' assistant deputy under secretary of the air force, Maj. Gen. Julian Cheater said two things, which stood out: India and the US militaries were doing 'complex exercises to develop interoperability', and under the US' Defence Trade and Technology Initiative (DTTI), the US was doing air-launched UAVs project with India. He said, 'The fight testing of these UAVs from C-130J aircraft in India and the US will be done this year (2023).' On the issue of Indian dependency on Russia for military hardware, it was made clear that commonality of equipment between the US and Indian military will help develop interoperability faster.

Has the US offered the F-35 aircraft to India was my parting question. Cheater said that this was an issue that India has to consider. However, in support of US' keenness for F-35 with India, US defence attache, Rear Admiral Michael Baker said that US' FA-18 (Boeing) and F-21 fighters were at the show. Beyond that, "Keep looking at the sky and wait for some surprises," he said enigmatically. II

### Report

### One Man Show

Aero India 2023 showcases Prime Minister Modi's skills

#### SMRUTI DESHPANDE

BENGALURU: THE STAGE WAS SET FOR THE 14TH EDITION of Aero India to be inaugurated by Prime Minister Narendra Modi. The Prime Minister's convoy drove in. But unlike the other dignitaries including defence minister Rajnath Singh, aviation minister Jyotiraditya Scindia, Karnataka chief minister Basavaraj Bommai, Karnataka Governor Thawar Chand Gehlot and minister of state for defence Ajay Bhatt, who were seated in the front row of the grand stand to watch the flypast, the Prime Minister walked toward the chair placed close to the runway--his back to the audience, his ministerial colleagues, as well as the grand stage. There he sat in grand isolation, watching the flypast.

Post the fly-past, Prime Minister Modi inaugurated Aero India 2023 by unveiling a commemorative stamp. "The fact that 100 countries are participating in the show, shows the amount of trust that the world has started putting in India," he said in his address, adding that the participation of different countries and CEOs' will ensure that Aero India's global potential rises, with the event acting as a medium to take India's relations with friendly foreign countries further ahead.

"Aero India today reflects new India's new approaches," Prime Minister said. "There was a time when this event was limited to being a show or a mere window to India. But in the past few years, the country has changed this perception too. Today, Aero India is not merely a show, it is India's strength. Today, it focuses on the Indian defence industry's scope and self-confidence. This is because today, for foreign defence companies, India is not limited to being a market. Today, India is looked at as a potential defence partner. This partnership extends to even those countries that are far ahead in the defence sector. For any country looking for a trustworthy partner to fulfil its defence and security needs, India is proving to be that partner. Our technology is cost-effective and credible for these countries."

Speaking about the Tejas fighter, he said that a roaring Tejas in the sky is a testimony to India's Make in India programme. He said that exports are picking up pace like never before. "The country that was the largest importer of arms, today is exporting equipment to 75 countries. In the past five years, India's ex-



ports have risen by six times. By 2024-2025, we aim to take the total cost of exports to USD 5 billion," he said. Towards that end, he urged the private sector to invest in country's defence sector.

"Amrit kaal's India is heading ahead like a fighter pilot—a country that is not afraid of touching heights. The country thinks sharply and uses foresight, just like a fighter pilot. Most importantly, no matter how fast the speed or the height is, it is always connected to its roots, to know the ground situation—just like a fighter pilot," he added for good measure.

### **SHOW HIGHLIGHTS**

Defence minister Rajnath Singh held a press conference a day prior to the show. Highlights from his address.

The event exhibition area spans 35,000 sqm, as against 23,000 sqm in 2021. Flying display includes 67 aircraft, as opposed to 64; static display has 36 aircraft as opposed to 19; 809 exhibitors as compared to 600; and 98 nations, as against 55.

- On February 14, Indian MoD will host 'SPEED' (Shared Prosperity through Enhanced Engagements in Defence).
- The CEOs roundtable will witness the participation of 73 business

leaders; 27 of them would be from foreign nations.

- Defence ministers from 32 nations and air chiefs from 29 friendly-foreign nations attending.
- Defence Ministers' Conclave to focus on joint development of defence platforms, hardware and export of those made-in-India.
- 250+ MoUs to be signed.
- Total of 115 companies, 227 products to be a part of the aero show







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### **From India for the Region**

Lockheed Martin to build a Heavy Maintenance Centre for C-130J in India





#### SMRUTI DESHPANDE

BENGALURU: AT LOCKHEED MARTIN'S ROUND TABLE held at the side-lines of Aero India, the US defence behemoth announced its purpose of building a Heavy Maintenance Centre (HMC) in India. According to director, Global Pursuits, Lockheed Martin Aeronautics, Timothy J. German, the company plans to open a heavy maintenance centre in India to service not only the Indian C-130Js, but also C-130s in the region.

"Lockheed Martin is excited about the opportunity to establish a heavy maintenance centre in India. The reason this is interesting and exciting is because LM certifies HMCs in service to work on C-130s," German said. "Lockheed has only two authorised heavy maintenance centres to work on C-130Js. One is in the UK and the other is in Canada." It is in response to the DAP-2020 that Lockheed Martin is exploring the formation of a certified cross-platform HMC in India.

While praising the IAF's C-130J operations, German said that it is impressive what the IAF is doing with the aircraft. The IAF holds a world record of highest-altitude landing at the DBO as well as the lowest-altitude landing at the Dead Sea. In 2021, Lockheed Martin signed a follow-on support contract for five more years.

Vice President, India Aeronautics Strategy and Business Development, Mike Kelly spoke about the F-21 fighter aircraft— LM's pitch for India's Multi-Role Fighter Aircraft (MRFA) programme. He said that Lockheed Martin is proud of its F-21 offer. He also said that the aircraft would complement Rafale and Tejas multi-role combat capability. He said that the aircraft would have a lower lifecycle cost being a single-engine aircraft.

COO, TATA Lockheed Martin Aerostructures Ltd (TLMAL), Kiran Dambala said that the facility has delivered more than 190 C-130J empennages. Till today, the facility has produced two variants and seven components of the C-130J empennage.

### N E W S

### F-35 Keeps its Date with Bengaluru

The United States Air Force's (USAF) newest fifth-generation fighters – the stealthy, supersonic, multirole F-35A Lightning II and F-35A Joint Strike Fighter – will make their debut at Aero India 2023. After a journey from Hill Air Force Base in Utah, United States, the F-35A Lightning II Demonstration Team will impress crowds with a demo of its unique aerial capabilities. The F-35A Lightning II from Eielson Air Force Base in Alaska will be on static display.

The F-35's engine produces 43,000 pounds of thrust and consists of a 3-stage fan, a 6-stage compressor, an annular combustor, a single stage high-pressure turbine, and a 2-stage low-pressure turbine.

In addition to the F-35, an F-16 Fighting Falcon duo will conduct daily aerial demonstrations from February 13-17, showcasing the capability of one of the USAF's leading fighter jets. On static display, the F/A-18E and F/A-18F Super Hornet are multirole fighters.

Major General Julian C. Cheater, Assistant Deputy Under



Secretary of the Air Force, International Affairs, said, "The F-35 represents the leading-edge of U.S. fighter technology. Aero India is an ideal forum to showcase the most advanced, capable, lethal, and interoperable weapons systems the U.S. has to offer. This system and others are designed to penetrate and defeat advanced adversary air defenses." II



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### **By Invitation** | Lockheed Martin



### **Sharp and Swift**

Lockheed Martin recognized HELLFIRE II's only international supplier at Suppliers Conference 2022



AT LOCKHEED MARTIN'S ANNUAL SUPPLIERS Conference held in Bengaluru, SASMOS HET Technologies Ltd. was awarded as an Outstanding Supplier by Lockheed Martin RMS and Missiles and Fire Control Global Supply Chain Organizations and the program teams. SASMOS is a critical player in the HELLFIRE II's supply chain as the producer of its mission-critical cables.

This recognition was for their dedication to the success of the Aegis Low Noise Amplifier (LNA) and HELLFIRE programs. Lockheed Martin representatives praised SASMOS for their dedicated support and partnership as the sole international supplier for the HELLFIRE II AGM-114R missile for the past two years. Despite the challenges of the pandemic, SASMOS successfully delivered over 18,000 assemblies, showcasing a strong customer-focused approach and meeting or exceeding expectations.

The precision-strike AGM-114R multi-purpose HELLFIRE II consolidates the capabilities of all previous HELLFIRE II variants equipped with semi-active laser seekers into a single missile that defeats a broad range of targets. It can be launched from multiple air, sea and ground platforms, autonomously or with remote designation.





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### **Report** | BrahMos

### **Export Prospects Brighten**

BrahMos supersonic cruise missile is attracting strong global interest

#### ATUL CHANDRA

THE YEAR 2023 MARKS 25 YEARS OF BRAHMOS Aerospace, the joint venture between the Defence Research & Development Organisation and Russia's NPO Mashinostroyeniya (NPOM). In its silver jubilee year, BrahMos Aerospace is eyeing additional export prospects following its maiden export order to the Philippines in January 2022.

The Philippine order was a long time in the making. However, it now appears that a repeat order for the supersonic cruise missile is likely with the Philippine Army expressing interest in the system. In a recent interview with FORCE, chief executive officer and chief managing director, BrahMos Aerospace, Atul Dinkar Rane, said the company was also engaged in serious talks with three-four countries, while preliminary discussions were underway with another five-six countries. Vietnam and Indonesia are also said to have expressed keen interest in procuring the weapon system.

The continued strong interest in the weapons system, stems from the fact that it is proven in service with the Indian Army, Indian Navy and Indian Air Force (IAF), which inducted the weapon system in 2001, 2007 and 2020 respectively.





### **Export Win**

The Philippines joins India in being the only country to have access to the Mach 3 BrahMos supersonic cruise missile, which is being acquired by the Department of National Defence (DND) of the Republic of Philippines for the Philippine Navy.

BrahMos Aerospace Private Limited (BAPL) will deliver a Shore-Based Anti3-Ship Missile system to the Philippine Navy. All three missile batteries will be delivered to the Philippine Marines in a deal valued at an estimated Rs 2,812 crore (USD 375 million). These missiles will be operated by the Philippine Navy's Coastal Defence Regiment. BrahMos Aerospace will also undertake operator and maintainer training and provide an Integrated Logistics Support (ILS) package. The first BrahMos Shore Based Anti-Ship Missile Battalion has already been activated in the Philippines.

The BrahMos cruise missile procurement was approved by the office of the Philippine President for inclusion in its Horizon 2 Priority Projects in 2020. The armed forces of the Philippines are now in the third phase of their 15-year modernisation programme that started in 2012. The first two phases, Horizon I (2012-2017), Horizon II (2018-2022) have been completed and Horizon III (2023-2027) is now underway.

### **Continuous Improvement**

Ever since the first test launch of a BrahMos missile took place in India in June 2001, there have been continuous upgrades and improvements. Deliveries of the supersonic missile systems to the Indian Army started in June 2007, and over the years, Block I, Block II and Block III variants have entered service. The navy inducted BrahMos in 2005 and uses them in the anti-ship and land-attack roles. The missile warheads have also been improved, enhancing the destructive power of the weapon system.

New variants, include the Brahmos Air Launched Cruise Missile (ALCM) Extended Range Version. This was successfully test fired by the IAF in December 2022 against a ship target from a Su-30MKI aircraft. The Su-30MKI is currently the only IAF platform, which can carry the BrahMos ALCM and the 2,500kg missile is gravity dropped from the aircraft. The extended range capability of the missile affords the air force with strategic reach and will allow it to dominate future conflicts.

BAPL received a contract worth approximately Rs 1,700 crore from the ministry of defence in September 2022, for additional dual-role capable surface to surface BrahMos missiles to be procured under the 'Buy-Indian' category. The procurement of Next-Generation Maritime Mobile Coastal Batteries (Long Range) for the navy which will use BrahMos missiles was approved by the Defence Acquisition Council (DAC) in August 2019.

### **Ramping Up Production**

BrahMos Aerospace has started work on a new manufacturing centre as a modern, state-of-art facility in the Lucknow node of the Uttar Pradesh Defence Industrial Corridor (UP-DIC). This new facility will also be the site for the design, development and production of the BrahMos-NG (Next Generation) missile. An initial investment of Rs 300 crore is being made in the new facility, which once fully operational will produce 80-100 missiles a year. The BrahMos-NG is expected to be deliver a dramatic advance over its predecessor and will be lighter, allowing it fitment on a range of aircraft including the indigenously developed Tejas Mk-1A and Tejas Mk2.

An entire ecosystem has been created and nurtured by BAPL in recent years and it has also continued to increase the indigenous content on the missile, which now features an Indian propulsion system, airframe, power supply along with other major indigenous components. The indigenous propulsion system is now in series production, along with non-metallic airframe components and fuel management system, and other major indigenous components including a DRDO designed seeker. II

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### Report | MTA



### **Dragon on the Doorstep**

After scrapping the JV talks with UAC, IAF Seeks Bigger MTA, Issues RFI

#### PRASUN K. SENGUPTA

FOUR YEARS AFTER IT WITHDREW from the project to procure a lighter and smaller turbofan-powered multirole transport aircraft (MTA) from a joint-venture between Hindustan Aeronautics Ltd (HAL) and Russia's United Aircraft Corp (UAC), the Indian Air Force (IAF) on 9 December 2022 issued a new request for information (RFI) for the procurement of MTA with a payload capacity of between 18 and 30 tonnes. The last date for submissions to the RFI of February 3 has now been extended to March 31. The three main original equipment manufacturers (OEM) expected to bid for this project are Airbus Military Aircraft with its A400M Atlas airlifter, Japan's Kawasaki Heavy Industries with its C-2 airlifter, and Brazil's Embraer with its C-390 Millenium.

The RFI states: 'The overall time frame of production, delivery with stage wise breakup of the entire project post conclusion of contract is required to be submitted. It is envisaged to commence deliveries of platform within 36 months of signing of contract. The vendors are to provide Rough Order of Magnitude (ROM) cost of aircraft and associated equipment, among others, for a batch of 40 aircraft/ 60 aircraft/ 80 aircraft, respectively.'

The RFI has also asked the OEM to indicate the scope of work related to MTA, which would be undertaken under the 'Make in India' initiative under an appropriate category, in addition to stating the capability to undertake indigenous (i.e., licenced) manufacture of systems, sub-systems, components, consumables, spares, ammunition and materials of the main equipment and platform in India, either through its own subsidiary or in a joint-venture and the time-period for developing the infrastructure in India for such manufacturing activities.

Methods to enhance indigenisation and to set up a dedicated manufacturing line, including design, integration and manufacturing processes in India, either through its own subsidiary or in a joint-venture, are to be detailed in the RFI submissions. Also, the capability of Indian vendors to indigenously design and develop the required equipment along with progres-



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### Report | MTA





sive levels of indigenisation, including use of indigenous military material, delivery capability, maintenance support and life-cycle support is to be specified. The OEMs have also been asked to consider making India, a regional or global hub for manufacturing and maintenance, repair & overhaul (MRO) of the chosen MTA.

The main reason why the IAF is seeking bigger MTAs is the changed operational scenario that now calls for swiftly airlifting heavy and medium armoured vehicles to areas close to the Sino-Indian borders, which have, since mid-2020 become highly unstable. In addition, the IAF also wants the option of para-dropping at short notice vehicles like armoured personnel carriers and infantry combat vehicles from such MTAs.

But contrary to popular perception, the to-be-acquired MTAs will not serve as direct replacements for the IAF's 94 remaining Antonov An-32REs (with 6-tonne payload capacity), which will be decommissioned in phases starting from 2030. Instead, additional Airbus Military C-295MWs (with 9-tonne payload capacity) will be procured beyond the 56 that have already been ordered. It may be recalled that in September last year, the ministry of defence inked a Rs 21,935 crore contract with Spain-based Airbus and Space SA for the procurement of 56 C-295MWs to replace the IAF's existing Hawker Siddeley HS-748 Avro transport aircraft. Airbus and Space SA's industrial partner in India is Tata Advanced Systems Limited (TASL). Together, they will be producing the C-295MWs at a manufacturing facility now being set up in Vadodara, Gujarat. II



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### **Report** | Missiles

### **At Long Ranges**

### Standoff missiles are an indispensable source of for air power

#### SMRUTI DESHPANDE

RUSSIA'S OFFENSIVE IN UKRAINE, which has now entered its ninth month, has been dominated by the use of standoff weapons in a major manner. Russia has made extensive use of air, missile and artillery bombardments on Ukrainian cities and military facilities. A form of non-contact warfare, standoff missiles have been used extensively from the beginning of the war in February 2022. Russia has used several precision standoff missiles to hit key targets in Ukraine. In retaliation, Ukraine too has been gathering similar weaponry from the West.

On the first day of the war, according to the US, Russia fired roughly 100 missiles

from land and sea. This included rockets, short and medium-range ballistic missiles, cruise missiles and surface-to-air missiles. Among the weapons that Russia used were the subsonic 3M14 Kalibr (NATO has termed it as the SS-N-30A), which has a 450-kg payload and a range of 1,500-2,500 kms. Another missile, Iskander, a short-range ballistic missile, was also used by Russia. It has a range of 300-400 kms. Apart from these, Tochka, developed during the Cold War, was employed. It is a short-range ballistic missile and can carry conventional, nuclear or chemical warheads. The missile's maximum range of fire is 70 kms.

According to reports, Russia had employed the Tochka armed with a 9N123K submunition warhead. The KH-31P, a supersonic anti-radiation missile with a standoff range, was used by Russia to knock out radar sites, according to The Warzone. Reuters reported that on October 10 these missiles tore into intersections, parks and tourist sites in the capital Kyiv. "The barrage of dozens of cruise missiles fired from air, land and sea was the biggest wave of air strikes to hit away from the front line, at least since the initial volleys on the war's first day, February 24," it said.

These missiles, launched from land, sea and air targeted command and control facilities, air defence sites, air bases, facilities in the Black Sea port city of Odesa among other important targets. The novelty factor in this is that Russia, in the recent past, was not known to be



using precision-guided missiles extensively, unlike the US.

### **United States**

The US established this way of fighting wars during Operation Desert Storm. The war was the first combat test of the cruise missile system. It also marked the first coordinated Tomahawk and manned-aircraft strike in history.

According to the US' Public Broadcasting Service (PBS) Frontline, "Within the first few minutes of Operation Desert Storm, Tomahawk missiles launched from the battleships Missouri and Wisconsin struck with accuracy at Iraqi command centers, and radar installations." In the war, Tomahawks were used to destroy surface-to-air missile sites. command and control centres, electrical power facilities and were "credited with the destruction of Iraq's presidential palace." After the war, the US' major emphasis lay on increasing the standoff range of the air-delivered munitions and improving their accuracy and lethality.

Missiles with standoff ranges include ballistic missiles, cruise missiles and glide bombs. The significance of such weapon systems is that they can be launched from a distance of up to hundreds and thousands of kilometres.

Ukraine has asked the US for its Army Tactical Missile Systems (ATACMS), which the US refused as the Guided Multiple Launch Rocket Systems (GM-LRS) that they have sent by the thousands (as per The New York Times) to Ukraine are sufficient to hit their targets even in Crimea. The long-range missile, ATACMS can strike up to 190 miles (300 kms), with the warhead carrying 375 pounds of explosives.

The ATACMS is the US Army's oldest surface-launched missile in service. It was developed in the 1980s against the Soviet Union. This weapon has been fired by the US during Operation Desert Storm to strike Iraq's medium-range ballistic missile launchers and surface-to-air missile sites. It is because of the range of this missile that Ukraine wants to procure this missile. As The New York Times puts it, "Compared to the GMLRS, the version of the ATACMS that Ukraine wants carries an explosive warhead that is about 50 per cent larger and can strike targets more than three times as far." The US daily reported that a prototype of its replacement is being test-fired in New Mexico. "That weapon, called the Precision Strike Missile, will fly to ranges previously barred by the Intermediate-Range Nuclear Forces Treaty," the report stated.



TOP & ABOVE China's DF-17 TBM with HGV-2; Lockheed Martin's ATACMs missile

This goes to show how Russia and the US are investing in building more missiles of longer standoff ranges. The US, in fact, is advocating the use of long-range missiles in the Indo-Pacific for countries such as Japan and Australia, to safeguard the region against China. In an interview to Nikkei Asia, the US Commander of the Marine Corps Forces Pacific, Lt Gen. Steven Rudder Rudder stated that longrange strike capabilities are crucial for the US and Japan to deter hostile military activities in the Western Pacific. Lt Gen. Rudder said the use of US land-based naval strike missiles, acting in concert with Japanese-made Type 12 surface-to-ship cruise missile units, "allows us to conduct sea denial operations."

Japan's surface-to-ship missiles currently have a range of over 100 kms, but there are plans to extend this distance

beyond 1,000 kms, putting coastal areas of China and North Korea in reach. Nikkei Asia said Washington was believed to be in talks with Tokyo over deploying an anti-ship missile unit, aiming to place it in Japan by around 2027. This comes in the backdrop of the PLA firing five ballistic missiles that landed inside Japan's exclusive economic zone as a part of simulating a blockade of Taiwan in the Taiwan Strait. Lt Gen. Rudder's comments came a day after Japan announced that it would start producing longer-range missiles and research hypersonic missile systems to combat escalating regional tensions.

In July, the US State Department approved a USD 23 million sale of 80 Joint Air-to-surface Standoff Missile-Extended Range (JASSM-ER) missiles to Australia. The stealth cruise missiles have

### **Report** | Missiles

a 935 kms range and can be deployed from the Royal Australian Air Force's (RAAF) F-35 Lightning II or F/A-18F Super Hornet fighters.

The US has upped its game when it comes to standoff missiles. CNN, quoting a defence official, reported that the US successfully tested a hypersonic missile in mid-March but kept it quiet for two weeks to avoid escalating tensions with Russia as President Joe Biden was about to travel to Europe. In a first test of the Lockheed Martin version of the system, the Hypersonic Air-breathing Weapon Concept (HAWC) was launched from a B-52 bomber off the west coast. The country is far behind China and Russia in developing, testing and fielding hypersonic weapons.

Most recently in October, the US test launched a rocket for the development of hypersonic weapons. The rocket carried 11 experiments to test and gather information for hypersonic weapons. The country has prioritised development of hypersonic missiles after China's tests and Russia usage of hypersonic missiles in its invasion of Ukraine.

Apart from this, the race for hypersonic missiles is growing by the day. Russia unveiled a weapon called the Kinzhal in 2017 and a hypersonic boost-glide vehicle, the Avangard, in 2019. China paraded a rocket-boosted hypersonic glide vehicle (HGV), the Dongfeng-17, in a recent military parade. Foreign Policy reported that the Pentagon's fiscal year 2023 budget request asks for USD 4.7 billion for research on hypersonic weapons, a boost from USD 3.8 billion in fiscal year 2022. According to Science, "Australia is collaborating with the United States on a Mach 8 HGV, and India with Russia on a Mach 7 HCM. France intends to field an HCM by 2022, and Japan is aiming for an HGV in 2026, the US Congressional Research Service noted in a July 2019 report."

### China

A number of studies have shown that China has developed capabilities to strike the US and its allies with spacebased weapons, laser weapons, nuclear arsenal and electromagnetic rail guns and hypersonic missiles.

A 2021 study by Lowy Institute suggested that China can strike Australia from its bases using the long-range bombers and missiles. China has developed formidable military capabilities for itself. Last year in October, according to US intelligence, China tested a nuclear-capable hypersonic missile in August that circled the globe before speeding towards its target, demonstrating an advanced space capability that caught US intelligence by surprise. This test missed the target by 32 kms.

But given that it was an initial test, Pentagon officials called the test "close enough." The Financial Times, which brought out the first report regarding the matter, stated that the Chinese military launched a rocket that carried a hypersonic glide vehicle which flew through low-orbit space before cruising down towards its target. The Guardian reported that the test is believed to have also included the release of a separate missile that rocketed away, falling harmlessly into the South China Sea.

Neither the US nor Russia has demonstrated this ability. Glide vehicles are launched into space on a rocket but orbit



the earth under their own momentum. They are slower than ballistic missiles, flying five times the speed of sound. The difference is that the shape of the vehicle allows it to manoeuvre toward a target, away from the defences. This makes it harder to track. China is focusing on its nuclear capability. Satellite data revealed China's construction of new nuclear missile silos in Gansu and Xinjiang in western China. The country is known to have maintained only about 20 silo-based intercontinental ballistic missiles (ICBMs), the Carnegie Endowment for International Peace stated. But satellite imagery showed that the country is likely constructing more than 200 new missile silos.

In 2019, China unveiled a hypersonic medium-range missile, the DF-17, which can travel around 2,000 kms and carry nuclear warheads. In June 2022, China tested a land-based missile-interception system that "achieved its expected purpose," as per China's defence ministry. This goes to show how China has been ramping up research into all sorts of missiles, those that can destroy satellites in space to advanced nuclear-tipped missiles. According to China's state media, the country has been conducting anti-missile system tests since 2010. While on the one hand, China has been building formidable missile capabilities, on the other hand it has also been conscious of building missile defence systems that will safeguard the country against incoming missiles.

In 2018, China announced that it had successfully tested its first cutting-edge hypersonic aircraft that can carry nuclear warheads and penetrate any current generation anti-missile defence systems. The Xingkong-2 or Starry Sky-2, was launched in a target range located in Northwest China, the state-run China Academy of Aerospace Aerodynamics (CAAA) said in a statement. Launched in a rocket, China's waverider was released in the air after about 10 minutes. It flew independently, made large-angle turning manoeuvre and landed in the targeted area as planned, the statement said. The flight vehicle reached 30 kms in altitude at Mach 5.5-6. The hypersonic aircraft was designed by the CAAA in collaboration with the China Aerospace Science and Technology Corporation. Waverider is a flight vehicle that flies in the atmosphere and uses shockwaves generated by its own hypersonic flight with the air to glide at high speed, Song Zhongping, a military expert told the state-run Global Times.

In May this year, China tested a new air-breathing engine during a simulated

flight test achieving hypersonic speed. Chinese scientists have found a breakthrough in creating a hypersonic missile that will use hydrocarbons as fuel and employ a rotating detonation engine. This new engine will help power a plane or a missile up to five times the speed of sound or even faster.

Further, China is trying to create a hypersonic weapon that can hit a moving target while itself moving at five times the speed of sound. The South China Morning Post stated that the group of scientists developing this have been given a deadline of 2025 to provide technology for next-generation hypersonic missiles.

Early this year, the People's Liberation Army Navy (PLAN) released the first video footage of a Chinese warship, the Type 055 cruiser, firing a YJ-21 hypersonic anti-ship ballistic missile. Anti-ship missiles act as China's anti-access/area-denial (A2/AD) capabilities.

China has an important asset in the form of its Rocket Force, known as The People's Liberation Army Rocket Force (PLARF), which is responsible for organising, manning, training, and equipping China's strategic land-based nuclear and conventional missile forces as well as their supporting elements and bases. The PLARF has been rapidly expanding and modernising, as per the country's evolving strategy regarding deterrence.

#### India

The late Chief of Defence Staff Gen. Bipin Rawat (retd) had in September 2021 said India may raise a rocket force of its own, which could potentially control and maintain the country's missiles. While this was a welcome announcement, in a way it was looking at the stark capability gaps between India and China. The PLARF is believed to have the ability to strike against critical Indian military and civilian targets. Hence, while a rocket force is the need of the hour, no progress has been made on such an exclusive force. But tests of different missiles are regularly undertaken.

Last year, air-launched variants of the Brahmos missile, extended range Pinaka rockets, a new vertically-launched shortrange surface to air missile and the Agni Prime ballistic missile were tested by the DRDO. The DRDO and the IAF also test-fired the indigenously designed and developed Standoff Anti-tank (SANT) missile from the Pokhran ranges. The missile has a range of over 10 kms. The DRDO also tested a long-range bomb and smart airfield weapons for the IAF.



In October 2022, the DRDO test-fired the Agni Prime new generation ballistic missile. It is the latest and sixth variant of the Agni series missiles. Agni Prime is a new generation advanced variant of the Agni-class of missiles with range capability of 1,000-2,000 kms. Agni-V, with a range of 5000 kms, which uses a three-stage solid fuelled engine, is India's contender for the intercontinental ballistic missile (ICBM). It was tested last year in October. Prithvi, a short-range surface-to-surface missile, has a range of 350 kms.

Last year in August 2021, India testfired the 1000-km range Nirbhay cruise missile from the Chandipur testing facility. The subsonic cruise missile was fired tested for 100 km in flight. The firing was a partial success. It carries a convention warhead of 300 kgs weight and can hit targets up to 1500 kms. The missile is capable of flying between 50 metres and four km from the ground.

The Indian Army in May 2022 decided to acquire two Akash Prime missile regiments. Capable of simultaneously engaging multiple targets in group mode or autonomous mode, the Akash missile system has a built-in Electronic Counter-Counter Measures (ECCM) features and has been configured for a mobile platform. The full system comprises a launcher, a set of missiles, a control centre, a built-in mission guidance system, a C4I (command, control communication and intelligence) centre and supporting ground equipment in addition to its radar, which has been christened Rajendra. It has an operational range of about 30 km and flight altitude of around 18 km.

The Nag anti-tank guided missile has already been inducted into the services. It has a range of about 20 kms. The Medium Range Surface to Air Missile systems was given to the IAF's 2204 Squadron in September 2022, The Indian Express reported. According to the report the air-to-ground Udram, a New Generation Anti-Radiation Missile (NGRAM), has cleared initial tests and "some more tests will be conducted soon." It has a maximum range of around 200 kms.

The BrahMos in use with the forces has a 300-500 km range and is a short-range, ramjet-powered, single warhead, supersonic anti-ship or land attack cruise missile. In May this year, India successfully tested an extended-range Brahmos missile with a 450-km range from a Sukhoi fighter.

The DRDO is developing a carrier vehicle for hypersonic and long-range cruise missiles. It successfully tested a Hypersonic Technology Demonstrated Vehicle (HSTDV), using the indigenously developed scramjet propulsion system and demonstrating its hypersonic air-breathing scramjet technology.

While India is one of the top countries in manufacturing missiles, it still has a long way to go when compared with China, Russia and the US. The ranges of missiles India has will need to be enhanced to strike targets located afar. For this, technologies such as seekers play a very important role. Being a coveted technology, the seekers are not easily available. While the DRDO is developing this technology, it is a slow process.

At a time when the nature of warfare has taken a flight into the future and is heavily guided by artificial intelligence, the use of standoff weapons for countries like India, who are yet to build a state-of-the-art AI infrastructure, remains important.

### 'Boeing India's Exhibit Will Highlight Strategic Investments the Company Has Made Across the Ecosystem'

— Managing director, Boeing Defence India, Surendra Ahuja

#### Can you share an overview of Boeing's fleet at service in India and the future opportunities being pursued?

Boeing has the largest fleet in defence among any foreign OEM in the country with the 11 C-17s, 22 AH-64 Apaches (with six more on order), 15 CH-47 Chinooks, 12 P-8Is, three VVIP aircraft and two Head of State aircraft and is a growing player in the civil market. We're regularly engaging with our defence customers in India on their current and future requirements for national security, and the value our portfolio can deliver to develop capabilities they require for the execution of their missions. In the near-term, those capabilities include the additional P-8Is, Apaches and Chinooks, F/A-18 Super Hornet Block III and additional training, sustainment, and performance-based logistics solutions. Just with the F/A-18 Super Hornet Block III, should it be down selected, Boeing projects an economic impact of USD 3.6 billion over 10 years to the Indian economy. This economic impact would be over and above Boeing's current offset obligations and plans.

#### How does Boeing support the sustenance of the C-17 fleet with the Indian Air Force?

We support the Indian Air Force C-17 fleet under the Globemaster Integrated Support Program (GISP) that maintains high mission capability rates by providing them access to an extensive support network for parts availability and economies of scale. Boeing provides comprehensive C-17 Globemaster III training solutions for aircrews and loadmasters with advanced simulation, courseware and computer-based training. C-17 operators can practice the complete range of tasks required for tactical military airlift operations and humanitarian missions, along with mission rehearsal of all scenarios including emergency procedures. Boeing's in-country C-17 training centre has completed thousands of training hours for aircrews and loadmasters.

The Apache and Chinook have been



extensively used by the Indian Air Force. What support is being extended by Boeing for support and maintenance of the fleet?

We believe there is a need for longrange maritime surveillance and ASW requirements in the Indian Air Force. Boeing offers long-term Performance Based Logistics (PBL) solutions for the platforms, namely, P-8I, Apache and Chinook, with a promise to provide the armed forces the same level of availability we are currently providing on the C-17 fleet through our GISP program. Boeing also offers training as a service on simulators on these platforms, just as we do today for the C-17 platform.

PBL strategies have a proven track record of transforming the legacy transactional support between Boeing and its customers, to solutions that increase aircraft availability, resolves Aircraft On-Ground (AOG) situations, and reduces the life-cycle cost of operating defence aircraft.

A PBL contract guarantees engineering, technical and material support for our customers at any hour and any operating location. Essentially, it ensures the relevant parts, available at the required location and at the right time. PBLs translate to higher aircraft availability through better utilization of inventory and the requirement for fewer spare parts. Specifically, for India, a PBL strategy will help resolve operational issues and further enable strengthening *Aatmanirbharta* for India's national defence industry. Boeing has globally executed over 12 Apache, and over six Chinook PBLs, bringing over 30 years of experience to enable long-term success of Vertical Lift readiness in India.

Notably, our offerings of the PBL solutions (also referred as: Aircraft Support Agreements) include our digital offering, that goes by the name of Mission Accelerator (MA). MA helps enhance availability of platforms significantly by providing predictability into maintenance. It also helps in operations and training of aircrew.

#### Can share some highlights from the journey of the Indian Navy's P-8I fleet, which just completed a decade in December 2022?

In December 2022, we completed a decade since the first P-8I was delivered to the Indian Navy. This is a significant milestone in our growing relationship with the navy. Notably, the Indian Navy was also the first international customer for the P-8 and today operates one of the largest non-US fleet.

Since the induction of the P-8I in the Indian Navy, Boeing has been supporting the fleet to ensure high rates of mission readiness. The 12 P-8Is in the Indian Navy's arsenal significantly contribute to the Indian Navy's capacity to keep the vast areas of interest in the Indo-Pacific under surveillance--while also playing a greater role in regional maritime security. The patrol aircraft is an integral part of the Indian Navy's fleet and has surpassed 35,000 flight hours since it was inducted. In addition to unmatched maritime reconnaissance and anti-submarine warfare capabilities, the P-8I has been deployed to assist during disaster relief and humanitarian missions. We believe there is a need for long-range maritime surveillance and ASW requirements in the Indian Ocean Region and the Indian Navy may have a requirement for more P-8Is and also more Harpoons and we stand ready to support them.

We continue to support the Indian Navy's P-8I fleet through Boeing's services business--providing spares, ground support equipment, and by positioning field service representatives at INS Rajali and INS Hansa so they are available to the Navy on 24x7x365 basis. Boeing's integrated logistics support has helped the navy attain the highest state of fleet-readiness. Boeing has built a 60,000 sqft Training Support & Data Handling (TSDH) Centre at INS Rajali, Arakkonam in Tamil Nadu as part of a training and support package



contract signed in 2019. The facility was handed over to the Indian Navy, and the trainings commenced in April 2022. The secondary centre at the Naval Institute of Aeronautical Technology, Kochi was also handed over to the Indian Navy last year. The indigenous, ground-based training will allow the Indian Navy crew to increase mission proficiency in a shorter time, while reducing the on-aircraft training time resulting in increased aircraft availability for mission tasking.

### While on the P-8I, can you share an update on the partnership with Air Works for the platform?

Boeing India's strategic collaboration with Air Works was an important first step under the Boeing India Repair Development and Sustainment (BIRDS) hub that envisions a collaboration with key local companies and businesses to develop India into an aviation and defence repair and sustainment hub. They have successfully concluded Phase 32 maintenance checks on six P-8I longrange maritime patrol and anti-submarine warfare aircraft operated by the Indian Navy (IN) so far. Three of them were in heavy maintenance checks concurrently, demonstrating a maturity and scale at par with developed global MRO hubs.

#### What exhibits/ displays is Boeing presenting at Aero India 2023, and what are your expectations from the Air Show?

We are excited to be at Aero India 2023. Among foreign OEMs, Boeing leads the way by far in investments across the aerospace and defence value chain--be it in manufacturing, engineering and R&D, skilling and training--helping develop the aerospace and defence ecosystem in India.

Boeing India's exhibit will highlight strategic investments the company has made across the ecosystem to build local services infrastructure, capabilities, workforce development and partnerships, while harnessing the strength of Indian talent and its large and growing network of more than 300 supplier partners. Boeing is committed to supporting the aerospace and defence industry in India with a vision to bring the best of Boeing to India and take the best of India to the world. II

### **Report** | Naval Fighters

### Naval Warfare

### Indian Navy must expedite its carrier borne fighter programme

#### ATUL CHANDRA

THE INDIAN NAVY NEEDS TO URGENTLY DECIDE ON ITS future carrier-borne fighter aircraft and induct and operationalise the fleet before the end of the decade if it is to address the growing asymmetry between the People's Liberation Army Navy (PLAN), which has stated plans to operate six aircraft carriers in the future.

The PLAN will also induct and operationalise an advanced carrier borne fighter aircraft before the end of the decade. The aircraft, referred to as the Shenyang J-35, is thought to be a navalised derivative of the FC-31. According to the Aviation Industry Corporation of China (AVIC), which is the manufacturer of the FC-31, the single-seat, twin-engine multi-role fighter jet is 17.3 meters long with a wingspan of 11.5 meters. When the J-35 enters service on PLAN aircraft carriers, the stealthy aircraft will provide a quantum leap in capability over its existing Shenyang J-15s. Publicly available images of the J-35, show the new Chinese fighter having a surprising similarity with the US F-35 fifth generation fighter jet.

China launched its third aircraft carrier in June and it will have a displacement of more than 80,000 tonne and be fitted with electromagnetic catapults. The Fujian will also likely be the first of the three PLAN carriers to deploy the J-35. The use of electromagnetic catapults will allow the new aircraft carrier, which is named Fujian (Hull 18) to also launch a carrier-based early warning aircraft (thought to be a derivative of the KJ-600 early warning aircraft) and a carrier-based advanced jet trainer (likely the JL-10). Surprisingly, despite China's success in development of Medium Altitude Long Endurance (MALE) Unmanned Aerial Vehicles (UAV), many of them armed; there does not appear to be a publicly announced maritime carrier borne version of these platforms.

The PLAN's existing aircraft carriers, CNS Liaoning (Hull 16) and CNS Shandong, (Hull 17) can carry 24 and 36 Shenyang J-15 carrier-borne fighters. Both the carriers feature Ski-Jump designs, which limit their ability to launch larger and heavier aircraft. The Shenyang J-15 is an unlicenced Chinese copy of the Sukhoi Su-33 and is presently the PLAN's only carrier borne fighter type. PLAN Shenyang J-15s landed and took-off from CNS Liaoning for the first time in November 2012 and the aircraft carrier is now being used to train PLAN fighter pilots flying J-15s in advanced carrier borne operations. Recent reports in the Chinese media have also indicated that new-build J-15s are being fitted with domestically developed engines. The new engines for the J-15 are thought to be the indigenously developed WS-10 'Taihang' turbofan engine and will replace the Russian Al-31F engines now fitted on the J-15. The PLAN is also slated to upgrade its J-15s to further enhance their combat capability. The PLAN also operates Su-30MKK from land bases.

The PLAN's new Type-075 amphibious assault ship Hainan also recently completed its full-time training assessments, marking a major milestone for China's first independently-built amphibious assault ship. "Right now, we have completed the full-time training assessment, getting closer towards high seas. Next, we will continue improving the level of the joint real combat training, with emphasizes on force-on-force training and technological training, giving full play to the operational effectiveness of ship Hainan in integrated operations," said Captain



China's FC-31



Zhang Meiyu, commander of the Hainan. The Hainan carries ship-borne helicopters and has the ability to transport Main Battle Tanks (MBT) and Armoured Personnel Carriers (APC).

### **Balancing Equation**

The rapid development of the PLAN's carrier borne aviation capability is likely to result in a highly capable force by the end of this decade. This makes the Indian Navy's quest to induct a modern carrier borne fighter all the more important as the aircraft needs to be selected, cost negotiations concluded and deliveries to commence before the end of the decade.

At present, the Indian Navy operates an estimated fleet of 40 MiG 29K/KUB carrier borne fighters. The Russian Navy is the only other operator of the type. The Indian Navy's first frontline MiG-29K squadron was commissioned in May 2013 13 at INS Hansa, Goa. The Ministry of Defence (MoD) concluded the first contract with Russian Aircraft Corporation (RAC) MiG in January 2004 for 16 MiG 29K/KUB aircraft and associated equipment in a deal worth USD 740.35 million (Rs 3,568.49 crore at that time). Deliveries began in December 2009. The MoD opted for 29 additional MiG 29K/KUB aircraft in March 2010 at a cost of USD 1.466.44 million (Rs 6.840.94 crore at that time). This order for 29 aircraft was completed by RAC MiG in 2016. Since its induction at least four aircraft have been in lost crashes. The service life of the MiG 29K/KUB aircraft is 6,000 hours or 25 years. The service life of RD-33MK engine which powers the MiG29K/KUB is 10 years/4,000 hours with an overhaul life of 1,000 hours.

Dassault Aviation and Boeing are offering the Rafale M (Marine) and F/A-18E/F Block III Super Hornet to meet the navy's requirement for 56 Multi-Role Carrier Borne Fighters (MRCBF). However, the initial buy may be reduced because of budget constraints. Boeing officials stress that the Super Hornet is fully compliant with INS Vikramaditya and INS Vikrant aircraft carriers with the ability to operate on the deck, in the hangar and on the lifts of both aircraft carriers. Both variants of the Super Hornet – the E-Variant (single-seater) and F-Variant (two-seater)—are being offered to the Indian Navy. Randy Rotte, Boeing's senior director for International Business Development for the Asia-Pacific region, provides some insights into the successful operational demonstration tests performed with two Super Hornet aircraft at the Indian Naval Station Hansa in Goa in July. The operational demonstration was undertaken at very heavy weights, simulating either the carriage of a very heavy fuel load or weapons load, he said in an earlier interaction.

The Super Hornet's ability to take off with a very heavy fuel load or weapons load means that the aircraft would be combat effective immediately after take-off from the aircraft carrier. Over the course of the tests held in July, two aircraft were used to perform multiple ski-jumps, roll-in and fly-in as well as performance flights. These flights were performed in a variety of weights in air-to-air, air-to-ground, and air-to-surface configurations as required by the Indian Navy. The Super Hornet will also have a greater degree of interoperability with Boeing P-8I maritime patrol aircraft and the navy's soon to be inducted Sikorsky MH-60R Anti-Submarine Warfare (ASW) helicopters. Boeing states that the Super Hornet's advanced network architecture enables it to interface with the P-8I and other US-origin helicopters and future carrier-based unmanned systems.

Boeing has been highly successful in the Indian defence market since the late 2000s with sales of the P-8I maritime patrol aircraft to the navy and C-17 Globemaster III, AH-64E Apache and CH-47I Chinook to the air force. Boeing recently announced a potential economic impact of USD 3.6 billion over 10 years to the Indian economy if the aircraft were selected. Boeing has committed to continued investments in manufacturing, engineering & technology transfer, sustainment, training and skilling and infrastructure. The economic impact would be over and above Boeing's current offset obligations and plans in the country, company officials say. Boeing is already sourcing over a billion dollars' worth of aviation services and components from India and company officials are keen to highlight Boeing's role in developing India's aviation ecosystem. The US airframer today works with over 280 different suppliers in India and is also investing USD 200 million in a state-of-the-art campus in Bengaluru.

### **French Flavour**

Dassault Aviation however, is an experienced campaigner in the Indian market and benefits from having the Rafale F3-R in operational service with the Indian Air Force (IAF). As a result, the Rafale M has more than a fighting chance of coming out ahead in the Multi-Role Carrier Borne Fighters (MRCBF)

### **Report** | Naval Fighters

<image>

competition. Dassault Aviation is also on a high with a string of sales successes for the Rafale in recent years. Asia remains a key market for Dassault Aviation and the French airframer will be keen to add an Indian order for the Rafale. India will be the first export customer for the Rafale M, if a deal fructifies and will be the only export customer to have selected the type for its air force and navy, apart. Unlike the Super Hornet, the Rafale M is available only as a single-seater for carrier operations and is today available in the F3 Standard. The Rafale M completed two decades of operations with the French in 2022.

Indonesia added to the Rafale orderbook in February, when it signed up for 42 aircraft for the Tentara Nasional Indonesia Angkatan Udara (Indonesian National Army Air Force). The Rafale has also found orders in Egypt, Qatar, Greece, UAE and Croatia in addition to France. The Indian order for 36 Rafales was made in September 2016. The UAE, which ordered 80 Rafale F4s in December 2021, is the largest export order for the aircraft. Egypt was the first export customer for the Rafale and has ordered 54 aircraft, 24 in February 2015 and 30 more in May 2021. Qatar ordered 36 Rafales (24 in May 2015, 12 in December 2017). Dassault Aviation is proposing the Rafale-M for the Indian Navy's requirement of 57 MRCBFs and the Rafale F3-R for the Indian Air Force's requirement of 114 Multi-Role Fighter Aircraft. Greece placed orders for 18 aircraft in January 2021 (12 used and six new fighters), while Croatia ordered 12 used Rafales in November 2021.

The Rafale F3-R, which entered the French Air and Space Force service in 2021, is the latest variant and all Rafales delivered since 2013 are fitted with the Thales RBE2 Active Electronically Scanned Array radar. The Rafale F1 standard was specific to first French Navy aircraft, the follow-on F2 standard added air-toground and air-to-air capabilities, while the F3 and F3R extended the versatility of the aircraft. The Rafale F1 Standard featured only air-to-air capabilities and became operational in 2004 with the French Navy on Rafales launched from the nuclear-powered aircraft-carrier Charles de Gaulle. The Rafale F2 entered service with the French Air and Space Force and the French Navy in 2006, while the Rafale F3 was qualified by the French MoD in 2008 and added the AREOS reconnaissance pod, anti-ship capability with the AM39 EXOCET (implemented in Rafale B, C, and M), and the nuclear capability with the ASMPA. The future Rafale F4 variant will see the addition of Helmet-Mounted Display capabilities, addition of the new Mica NG Air-to-Air Missile along with the ability to carry the 1,000-kg AASM Air-to-Ground Modular Weapon. It will also accommodate future evolutions of ASMP-A, SCALP, AASM 1000 kg weapons. French Rafale F4s will enter service in two stages in 2023 and 2025.

Indo-French military-to-military cooperation has increased substantially in the recent years and both nations celebrate 25 years of their strategic partnership in 2023. Defence minister Rajnath Singh held the fourth India-France Annual Defence Dialogue with France's Minister of Armed Forces, Sebastien Lecornu in New Delhi in November. A wide range of bilateral, regional, defence and defence industrial cooperation issues were discussed in the dialogue. During the dialogue, one of the key areas of discussion was defence industrial cooperation with a focus on Make in India. Future collaborations and potential co-production opportunities were discussed by both ministers. As part of his visit to India, Lecornu made a day-long trip to the Southern Naval Command headquarters and was hosted aboard INS Vikrant. II

### **By Invitation** | AMP

### For All Seasons

Astra Showcases India's Largest Portfolio of Indigenous Weather Radars



ASTRA MICROWAVE PRODUCTS LIMITED (AMPL) has been a pioneer in the design, development, supply, installation and maintenance of Meteorological products in India. A dedicated division catering to Meteorology and Hydrology market segments with in-house R&D, manufacturing, I&C and support teams is successfully supporting various customers for almost two decades.

**Wind Profile Radars:** AMPL has a diverse portfolio of custom-designed Wind Profile Radars (WPR) for Atmospheric Studies and Monitoring. The UHF Lower Atmospheric Wind Profiling Radar is designed in a transportable

Active Array configuration. These radars have a typical range of 5 km designed with 1.5m and 3m antenna variants. These compact designs feature Doppler Beam swinging, Active/semi-active Phased array antenna with a Direct IF Digital Receiver and Solid-State T/R Modules resulting in a compact configuration capable of easy transportability and quick deployment.

These radars have a typical height resolution of 30 m. The VHF Active-phased array Radar configuration offered by AMPL has an operating frequency of 50 MHz also featuring Doppler beam swinging technique, solid-state T/R Modules, direct RF Digital receiver and 37.5m height resolution. Such VHF radars are widely used by various weather and strategic agencies for Stratosphere-Troposphere Remote Sensing applications for ranges of up to 20 km.

**Doppler Weather Radars:** AMPL has offerings of SSPA based Doppler Weather Radars (DWR) capable of de-



tecting and estimating meteorological parameters. These C and X band dual polarized polarimetric Doppler weather radars can be operated locally or from remote Command and Control Centre. The radars are capable of generating polarimetric Doppler weather radar base data and products in specific formats. The systems can produce images as well as products from base data output utilizing its radar signal processor. The all-weather X-band radar, first in India, can be operated in a static setting atop a tower or from a trailer based mobile platform. The X-Band radar has a range of obser-

vation of more than 100 km with a range resolution of 75m. The C-band version is capable of catering to an observation range of more than 250 km with a range resolution of 150m.

Avalanche Monitoring and Detection System: This is a radar system designed and developed specifically for detecting snow avalanches, debris flow and mud slides. The system has

an operating frequency range of 10.1-10.5 GHz and is based on a modular architecture. It has a detection range of 3.5 km and coverage of 2 km. It is capable of supporting up to two antennae with separate coverage areas. The system is designed to operate on a DC input voltage of 9-36 VDC. The radar supports a simple, in-built user interface/HMI. The system is fully-capable of operating on Solar-based power supply, thus eliminating the need to have utility power at site. It is enclosed in a lightweight, IP 66 rated, EMI/EMC shielded weather proof enclosure. It is designed to operate in autonomous mode and requires no manual intervention after the initial set up. Owing to its compact form factor the system can be easily installed on a pole or mast.

To summarize, AMPL is fully geared up to design, develop, supply, Install, operate and Maintain a diverse portfolio of high-end weather radars either for customer specific applications or bulk-manufacture standard products to meet any present and future requirements of various agencies worldwide. ||

### Interview | CAS

### 'The IAF Plans to Induct Six Squadrons of MRFA in a Phased Manner. The IAF is Studying the Responses of the RFI Issued in April 2018'

— Chief of Air Staff Air Chief Marshal Vivek Ram Chaudhari PVSM, AVSM, VM, ADC



What are the short- and medium-term targets of the Centre of Excellence for Artificial Intelligence under UDAAN? What technologies is the IAF prioritising?

Keeping the future air warfare strategies in consideration, the Indian Air Force has taken proactive steps to embed AI-based technologies in all its war fighting processes. Absorption of AI is being enabled through AI Centre of Excellence with high end AI servers and big data storage facilities under the aegis of UDAAN (Unit for Digitisation, Automations, Artificial Intelligence and Application Networking).

The IAF is in the process of embed-

ding these technologies in short and medium term in the areas of Intelligence Surveillance and Reconnaissance, Command Control and Reporting, Campaign Planning, Forecasting Operational Stamina, Aircraft Maintenance and e-Governance. Technologies of Natural Language Processing, Deep Learning, and Machine Learning are being used for forecasting, predictive maintenance and intelligent decision making for Network Centric Warfare.

What is the update on the MRFA programme? There is speculation that MRFA may not materialise due to budgetary reasons and the IAF will be

#### forced to strike a balance with more Su-30MKI, LCA MkI & MkII, the Rafale already contracted for and the AMCA when it comes. What is the IAF's position on this?

The IAF plans to induct six squadrons of MRFA in a phased manner. The IAF is studying the responses of the RFI issued in April 2018 and the Air Staff Qualitative Requirements for the current proposal are being finalised prior to seeking government approval. The programme would be progressed under 'Make in India' initiative of DAP-2020 focusing on substantial transfer of key technologies to an Indian Production Agency (IPA). In this regard, feedback has been sought from vendors. On obtaining this information, the process of issuing the RFP would be initiated. There are no budgetary hindrances affecting the MRFA programme presently.

#### Has the IAF finalised Vision 2050? How will this be different from Vision 2020?

The IAF is currently working to finalise its Vision 2047 and we should be able to release it shortly. It would be significantly different from Vision 2020 as our environment, both external, and internal has changed significantly. We are making assessments of the future based on observed trajectories and trends, and formulating it accordingly. But suffice it to say, that the IAF of 2047, will be a true aerospace

The overarching effect of cyber and information on the conduct of conventional wars has created a new, hybrid and multi domain spectrum of conflict resulting in older tactics and strategies becoming passé. Therefore, to secure our borders, there is a definite imperative to Reimagine, Reform, **Redesign and Rebuild our** traditional war-fighting machinery and adapt to this new emerging paradigm

force capable of offering a wide range of options to the leadership in support of national security objectives.

Defence minister Rajnath Singh has recently spoken about the need for integrated theatre commands. What adjustments is the IAF willing to make to participate in integrated theatre commands without compromising its operational preparedness?

The need for Joint Planning, Distributed Control and Integrated Execution is the way forward. In this effort, our aim is to enhance our overall preparedness with robust joint structures at national level followed by an incremental approach towards bringing about jointness and coordination right to the last combatant.



Cyber and electronic warfare has emerged as two sides of a coin. While one protects the data, the other protects the waveforms carrying the data. What is the IAF doing about integrating these into its operational profile?

The overarching effect of cyber and information on the conduct of conventional wars has created a new, hybrid and multi domain spectrum of conflict resulting in older tactics and strategies becoming passé. Therefore, to secure our borders, there is a definite imperative to Reimagine, Reform, Redesign and Rebuild our traditional war-fighting machinery and adapt to this new emerging paradigm.

The new, hybrid and multi domain spectrum of conflict is a zone wherein 'Unconventional Operations' are being dovetailed in conventional wars. These carefully designed asymmetric operations involve activities that have the potential for devastating effects. The IAF also understands that the agility and swiftness of operations matters the most and therefore, we strongly believe that the integration of cyber and electronic domains has the capability to bring down the war fighting capability of an adversary and will help in safeguarding our interests. All electronic warfare sensors and their control networks are thus mandatorily evaluated for cyber security clearances before being integrated into our operational network. Also, live monitoring and auditing of EW systems is being done to ensure a safe cyber posture.

#### N E W S

### LCA Navy, Mig-29k Fighter Aircraft Land Onboard INS Vikrant



"The successful landing and takeoff of the indigenous LCA Navy on India's first Indigenous Aircraft Carrier is a momentous step forward towards the realisation of our collective vision of Aatmanirbhar Bharat. The maiden landing of the Mig-29K also heralds the integration of the fighter aircraft with INS Vikrant. Congratulations to all those who made it happen," Chief of the Naval Staff, Adm R Hari Kumar.

The Navy in a statement said, "INS Vikrant is the first indigenous aircraft carrier and the most complex warship ever built by our country. It is a matter of pride that the ship has been designed in-house by Indian Navy's Warship Design Bureau and constructed by Cochin Shipyard Limited." The ship had sailed for maiden Sea Trials on 4 August 2021. Since then, she has undergone sea sorties for trials of Main Propulsion, Power Generation equipment, Fire Fighting systems, Aviation Facility Complex equipment etc.

The Carrier was commissioned into the Indian Navy on 2 September 2022, the Prime Minister of India, Narendra Modi was the Chief Guest.

The Carrier has been undertaking extensive Air Operations with Rotary Wing and Fixed Wing aircraft since 13 December 2022 towards Air Certification and Flight Integration Trials for achieving the ultimate aim of being 'Combat Ready'. As part of the aviation trials, landing of LCA (Navy) and MiG-29K onboard INS Vikrant was carried out on 6 February 2023 by Indian Naval Test Pilots.

The landing of LCA(Navy) on deck has demonstrated 'AatmaNirbharta' in India's capability to design, develop, construct and operate indigenous aircraft carrier with in-



digenous fighter aircraft. The Navy stated that it is indeed a landmark achievement being the first time that trials of a prototype aircraft—indigenously designed & produced by Aeronautical Development Agency (ADA) and Hindustan Aeronautics Limited (HAL), has been successfully undertaken on an indigenous aircraft carrier. Further, the landing of MiG-29K onboard INS Vikrant is also a significant achievement as it marks the successful integration of the aircraft with the indigenous carrier as well as further enhances the Combat Readiness of the Navy. II



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### **Report** | Su-30MKI Upgrade

### Self Reliance in Upgrades

### With Russia badly hit by western sanctions, HAL to develop new avionics for Su-30MKI

#### PRASUN K. SENGUPTA

THE INDIAN AIR FORCE'S (IAF) long-overdue project of undertaking a multi-phase deep upgrade of its 261 Sukhoi Su-30MKI heavy multi-role combat aircraft (H-MRCA), which was set to take off in 2013, is at last poised to begin following a decision by the IAF to undertake the bulk of the work locally at a cost of Rs 35,000 crore. The Hindustan Aeronautics Ltd (HAL) is taking the lead as prime industrial contractor.

The bulk of the upgrade work will involve the installation of new mission avionics on 85 Su-30MKIs initially, including the 50 that were procured off-the-shelf from Russia two decades ago. Of the 272 Su-30MKIs that have been procured to date, 11 have been lost to crashes thus far, with the remaining now serving with 12 squadrons. The IAF intends to place orders in the future with HAL for another 12 licence-assembled Su-30MKIs as attrition replacements. Since 2013, HAL has been undertaking maintenance, repair and overhaul work on those Su-30MKIs that had already attained their mid-life period of 1,000 flight-hours (also known as time-between overhauls).

Originally, it was envisaged by the IAF that systems integration of the mission-avionics suite-developed by the Defence Research and Development Organisation's (DRDO) Bengaluru-based Defence Avionics Research Establishment (DARE) and HAL-would be undertaken by the Russia-based FSUE State Scientific Research Institute of Aviation Systems, or GosNIIAS, following which the Russia-based State Federal Unitary Enterprise Gromov Flight Research Institute at Zhukovsky will flight-test and certify the upgraded Super Su-30MKIs. HAL will next undertake avionics installation work at its Nashik facility.

### **Western Sanctions**

But given the severe sanctions imposed by several Western countries and their allies in Southeast Asia and the Far East against Russia in the aftermath of Russia's invasion of Ukraine, Russian military-technical and military-industrial entities have been hard-pressed to obtain microchip processors required for avionics, like the electronically scanned multi-mode radar (AESA-MMR) antennae that was to go on board the Super Su-30MKIs. Back in 2009, the Russia-based JSC V Tikhomirov Scientific Research Institute of Instrument Design had proposed its X-band AE-SA-MMR variant of the NO-11M 'Bars' (RLSu-30MK) PESA-MMR that currently equips the Su-30MKI.

As things now stand, the IAF wants HAL's Mission & Combat Systems Research & Design Centre (MCSRDC) to become the systems integrator, and the DRDO's Electronics Radar R&D Establishment (LRDE) to develop a customised variant of the indigenously developed 'Uttam' AESA-MMR (originally developed for the Tejas Mk.1A L-MRCA). Consequently, only the fire-control, weapons management and self-protection avionics suites will be upgraded (replacing Russian-origin hardware and software) using dual redundant MIL-STD-1553B databus-based architecture, along with MIL-STD-1760 stores (weapons) interfaces. The Su-30MKI's data handling system (DHS) and digital flight-control computer for fly-by-wire flight-control, which use the GOST 26765.52-87 databus protocol (the Russian equivalent of MIL-STD-1553B), will be retained since Russia has not shared the source-codes of its DHS with the IAF and HAL.





**ABOVE & RIGHT** Internal mid-band jammer; Unified mission computer and display processor

The two principal elements of this new architecture are the HAL-developed open-architecture mission computer and display processor, followed by a digital map generator, which is required for presenting navigational cues when the aircraft cruises in terrain avoidance mode with the help of the AESA-MMR (this architecture has already been applied to the IAF's 64 upgraded Jaguar IS/DARIN-3 interdictor/strike aircraft).

Other avionics due to go board include the HAL-developed solid-state data and video recording system, combined interrogator-transponder, SoftNet software-defined radio operating in VHF/ UHF and L-band channels, upgraded TACAN, upgraded RAM-1700A radar altimeter, flight data transfer unit, a new-generation health and usage monitoring system (HUMS), upgraded VOR/ ILS, modified Safran/Sagem Sigma-95N ring laser gyro-based inertial navigation system (RLG-INS) incorporating NavIC GPS navigation receiver, GPS splitter, a new infra-red search-and-track sensor, stores management system, blanking unit, flight data recorder, aviation clock, integrated standby instrument system, voice-activated command system for front cockpit, panoramic AMLCD cockpit displays supplied by SAMTEL-HAL Display Systems, MIL-STD-1760 stores interface boxes and pylon interface boxes. The tactical data-link will be the BNET-AR, supplied by Astra-RAFAEL Comsys Pvt Ltd, a joint venture between the Hyderabad-based Astra Microwave



Products Ltd (AMPL) and Israel's RAFA-EL Advanced Defense Systems Ltd.

### **Self-Protection**

For self-protection, the Super Su-30MKIs will incorporate an internal suite that is a variant of the D-29 suite, which DARE had developed back in 2013 for the IAF's MiG-29UPG M-MR-CAs. Elements of this suite will include a unified receiver exciter processor (UREP) that encompasses a DARE-developed and MoD-owned Bharat Electronics Ltd (BEL) built Dhruti digital radar warning receiver (already retrofitted by Alpha Design Technologies on the Su-30MKIs under the IAF's Project Eagle Eye, replacing the earlier BELbuilt Tarang Mk.3 receivers), electronic support measures (ESM) and electronic countermeasures (ECM) elements, along with the ELT-568 mid-band (Ku and Ka bands) self-protection jammer transceivers imported from Italy-based Elettronica.

While the MoD-owned Bharat Dynamics Ltd will supply the DRDO-developed flare cartridges, the chaff cartridges will be supplied by the UK-based Chemring. For high-band (X-band) jamming, the Super Su-30MKI will be equipped with twin wingtip-mounted high-band jammers that have been developed by DARE and are being built by BEDL. DARE is now developing a belly-mounted low-band jamming pod for jamming hostile D-/Eband airspace surveillance radars. Also, to go on board will be the RAFAEL-developed X-Guard towed decoy system, which is also used by the IAF's 36 Rafale

### Guest Column | Su-30MKI



M-MRCAs. Incidentally, the four IAF Su-30MKIs modified thus far to carry the BrahMos-A supersonic anti-ship missile already make use of the HAL-developed mission computers and weapons management computers, while Data Patterns Ltd has supplied the DRDO-developed fire-control system.

On August 26 this year, the DRDO formally completed the transfer of technology (ToT) to HAL for the production of the 'Uttam' AESA-MMR, that will first equip 44 Tejas Mk.1A L-MRCAs on order (the first 39 will use the EL/M-2052 AE-SA-MMRs supplied by Israel Aerospace Industries). According to HAL, it will take 48 months to develop a scaled-up 'Uttam' derivative for the Super Su-30MKI, with flight-tests slated to begin after 24 months of contract signature.

### **DC-MAWS Suite**

For DARE, the development of the six-unit dual-colour (ultra-violet and infra-red) missile approach warning system (DC-MAWS)—essential for all combat and combat-support platforms to provide hemispheric warning to pilots of incoming guided-missile attacks has been a particularly daunting task. The MoD's Defence Acquisition Council (DAC) had in September 2004 cleared the installation of DC-MAWS in 100 IAF aircraft (both fixed-wing and rotary-wing). DARE in January 2005 proposed to the IAF a project to design and develop DC-MAWS, jointly with the Israel's Ministry of Defence and Elisra.

In July 2006 IAF accepted the proposal and in March 2008 agreed to install DC-MAWS on all its Su-30MKI H-MRCAs and projected an initial requirement of 50 DC-MAWS suites. In November 2008, the MoD accorded financial sanction for the development and integration of DC-MAWS on Su-30MKIs by DARE at a total cost of Rs.193 crore (including a foreign exchange component of Rs 172 crore), with a project date completion (PDC) of 55 months (June 2013) under the mission-mode (MM) category.

On July 17, 2006, Cassidian, the defence and security division of the European EADS, and the MoD inked a contract for procuring a small number of MILDS AN/AAR-60 DC-MAWS. This MoD move came despite DARE signing a memorandum of understanding with Cassidian on the joint development of an initial 36 DC-MAWS suites for both fixed-wing and rotary-winged aircraft of the IAF and the Army Aviation Corps that made use of the MILDS AN/AAR-60 system with a planned initial operational capability for 2007. The agreement also included the co-production of these suites by BEL. In December 2008, DARE signed a tripartite USD 37 million (Rs 148 crore) contract with Israel's MoD and Elisra (now owned by Elbit Systems) for the joint development of a DC-MAWS suite with a projected PDC of 48 months (December 2012). The scope of the contract included delivery of six sensors for one DC-MAWS suite. HAL was selected by both the IAF and DARE as the nodal agency for structural modification of Su-30MKI airframes for integration of the DC-MAWS suite.

### **Heavier, Bigger**

Subsequently, DARE found out that the sensors (that make up the DC-MAWS suite) submitted by Elisra were heavier and bigger in dimension (24cm in height and 4kg in weight). In May 2009 DARE informed Elisra that the sensors might not be accepted for the Su-30MKIs as it would cause serious restriction on their flight envelopes. The IAF too expressed the same view in March 2010. But Elisra in June 2010 expressed its inability to make any significant weight reductions. The installation of the six sensors on the

Su-30MKI was not cleared in December 2012 by an expert committee at locations specified by DARE, as it would involve cutting the aircraft's internal structure and the destruction of internal thermal masking coatings.

Subsequently, the committee in January 2013 cleared the installation of only four DC-sensors with a limitation of only 15-degree angle-of-attack (as against the Su-30MKI's capability of 90 degrees). In February 2013, DARE approached the Su-30MKI's OEM (OKB Sukhoi and IR-KUT Corp) for expert review and clearance of the proposal for aircraft modification to integrate DC-MAWS sensors. In May 2013, the OEM clarified that the integration of DC MAWS sensors would significantly affect the Su-30MKI's flight performance since the DARE-recommended installation locations were highly sub-optimal.

In December 2011 the project cost was subsequently enhanced to Rs 228.80 crore because of exchange rate variation (ERV). This was further increased to Rs 273.80 crore in July 2013. The MoD also extended in July 2013 the PDC of the project by 24 months (up to June 2015). A Comptroller & Auditor-General (CAG) audit in October 2014 observed that though the increase in the weight of the DC-sensors was a cause of concern to the IAF as well as DARE, the sensors (four for each aircraft, instead of the originally envisaged six) were accepted with their present weights. With this the possibility of adverse effects on the Su-30MKI's flight envelope remained.

### **Audit Observations**

In response to audit observations regarding delays in the development of the DC-MAWS suite and its operational impact, DARE in January 2015 agreed that the performance parameters of the DC-MAWS on Su-30MKIs would be limited. It further added that the DC-MAWS requirement on Su-30MKIs was not originally envisaged by the IAF and hence DARE executed it as only a technology demonstration (TD) project, instead of MM project and the project was wrongly categorised as MM.

Subsequently, DARE relocated the installation of DC-sensors on the Su-30MKI to the satisfaction of the IAF and the expert committee, which concurred in February 2015 that the installation of all six sensors was imperative. Between March and April 2015, Elisra delivered all the six DC-sensors only after the completion of factory acceptance tests (FAT). The flight evaluation of DC-MAWS was also carried out between March and April 2015 on an Elisra-owned Cheyenne airborne testbed. An amount of Rs 194.16 crore had by then been incurred on the project by March 2015. The IAF stated in April 2015 that flight-trials of DC-MAWS on a Su-30MKI were expected to commence in December 2015.

The CAG audit also observed in June 2015 that in order to meet the latest PDC (June 2015) of the project, DARE, after development and testing of the DC-MAWS suite on an airborne testbed, closed the project claiming it to be successful. In order to prove the developed DC-MAWS suite on a Su-30MKI, DARE had proposed in June 2015 to take up a separate project. DARE further stat-

In response to audit observations regarding delays in the development of the DC-MAWS suite and its operational impact, DARE in January 2015 agreed that the performance parameters of the DC-MAWS on Su-30MKIs would be limited. It further added that the **DC-MAWS** requirement on Su-30MKIs was not originally envisaged by the IAF and hence DARE executed it as only a technology demonstration (TD) project, instead of MM project and the project was wrongly categorised as MM

ed that the delay in development was because of time taken (from February 2012 to February 2015) by the IAF to assess the impact on aerodynamics of the Su-30MKI.

In response to the draft report of April 2015, the DRDO reiterated in June 2015 the views of DARE that the DC-MAWS project was taken up as a TD effort and suggested to exclude the project from its draft report. The replies may be seen in the light of the fact that the IAF had clearly projected back in March 2008 the requirement of the DC-MAWS suite for Su-30MKIs and accordingly, the project was sanctioned under the MM category.

Also, neither the DRDO nor DARE took any initiative during the developmental phase to obtain an amendment to transition from the project from the MM to TD category. Further, flight evaluations of the developed DC-MAWS suite were carried out on a Cheyenne airborne testbed and as such, the success or otherwise of DC-MAWS with oversized sensors, would be known only after flight evaluation on modified Su-30MKIs, for which a separate sanction was awaited. Till then, the IAF's Su-30MKI fleet would have had to operate without DC-MAWS capability.

### **Project Revived**

In 2016, DARE once again succeeded in resuscitating the DC-MAWS project by proposing to install four DC-sensors to the fore and aft of each of the two Interface Beam Assemblies (one under each outboard wing pylon), with the remaining two sensors being mounted on the topside and belly of the Su-30MKI airframe. But such a configuration too has not yet been approved by OKB Sukhoi, which instead has cleared the MILDS-A installation configuration that had been proposed by the industrial partnership of Hensoldt (which bought over Cassidian), BEL and Alpha Design Technologies back in 2016 itself.

As a consequence of this, DARE has developed a DC-MAWS suite installation package that does not have the support of OKB Sukhoi and will therefore be regarded as an unauthorised and non-certified fitment, which in turn will lead to both OKB Sukhoi and IRKUT Corp withdrawing their airworthiness certifications for all such modified Su-30MKIs. The total product liability, therefore, will rest squarely on the shoulders of DARE and HAL, with devastating consequences for the IAF and its entire Su-30MKI fleet.

Instead, what the IAF should have done in the previous decade was to go for the very same certified DC-MAWS fitment configuration that was specified by OKB Sukhoi for the 18 Su-30MKMs of Malaysia that were delivered between 2007 and 2009. This would then have become a win-win solution for all the involved parties (Russian and Indian) and could well have generated similar solutions for the IAF's upgraded MiG-29UPGs. Instead, the evident criminal negligence displayed by the MoD, DRDO and DARE since the previous decade has only ensured that the IAF's MiG-29UPG and Su-30MKI fleets remain devoid of DC-MAWS fitments to this day.

### Interview | UAC

### 'Make in India' is Not Only the Framework to Meet the Requirements of the Indian side, But Also a New Opportunity for Partnerships, not only for the Indian market, But Also for the Russian Market'

— General Director, United Aircraft Corporation, Yury B. Slyusar

### How is cooperation between the UAC and India going at the moment?

Our cooperation continues. India is one of Russia's key partners in the field of military-technical cooperation, especially in aviation. Along with the work on programmes for licensed production, repair and modernisation of Sukhoi and MiG aircraft, UAC, together with our Indian partner, HAL, is also working on other projects.

#### Has this cooperation been affected in any way by the recent restrictions imposed against Russia?

Indeed, we are facing new challenges. This applies to external and internal markets, product demand and its structure. This also applies to the technological landscape and partnerships. This also concerns the tasks of developing enterprises in our regions of presence, as points of industrial and technological growth.

The sanctions have greatly affected the Russian air transport industry. Withdrawal of Western aircraft manufacturers from our market opens up a window of opportunity for the supply of up to 1,000 new passenger aircraft of all classes to the Russian market by 2030—not only made by UAC. This is a great opportunity, but also a serious challenge for Russian aircraft manufacturers. In this context, while increasing production capabilities, it is important for us not to limit ourselves to the domestic market.

From the point of view of developing cooperation with India, the 'Make in India' is not only the framework to meet the requirements and rules of the Indian side, but also a new opportunity for industrial partnerships, including production of products not only for the Indian market, but also for the Russian market and other countries. Today, the civil part is approximately 20 per cent of the volume of the Russian aircraft manufacturing business. The



remaining 80 per cent are military and dual-use products. Here the impact of sanctions is almost imperceptible. As far as our combat and transport aviation programmes are concerned, they are progressing according to their respective schedules.

What is currently happening is giving the Russian aircraft industry an important window of opportunity. Despite all the difficulties in achieving the required level of technological independence, pressing schedules, technological and logistical challenges, the main opportunity that the current situation gives us is guaranteed, clearly articulated and state-supported demand in the domestic market for the long term.

At the same time, despite new challenges, UAC remains a reliable partner, both in the terms of supply to our domestic market and for export. All our contracts are executed on time and with proper quality, despite the obvious difficulties that we face. We maintain and continue to develop relationships with all our partners.

#### In these conditions, how do you change your work? Maybe implementing new efficiency solutions?

Of course, in order to increase the

efficiency of our work—speed up decision-making, bring new products to the market, concentrate resources and design competencies—, we are carefully and thoughtfully integrating our manufacturing enterprises and design bureaus into a single company: UAC. We have recently adopted a new development strategy. It involves significant changes in manufacturing—the development and technical re-equipment of our enterprises. Considerable attention is paid to the development of next-generation military platforms, as well as hybrid and unmanned solutions.

I want to elaborate in detail UAC's operational-tactical aviation division. This July, UAC merged two leading design bureaus, Sukhoi and MiG, as well as manufacturing plants in Lukhovitsy, Novosibirsk and Komsomolsk-on-Amur also became a part of UAC. This means that both MiG and Sukhoi are no longer subsidiaries owned by UAC, but are part of a corporation with single management, financial resources, production, and so on. From my point of view, this gives UAC, the design bureaus and the factories significant advantages. Now UAC produces Sukhoi and MiG aircraft. This means that both design bureaus and factories now have access to all the resources of the corporation, and they will have more opportunities through use of a common pool of resources.

#### Last year you unveiled a Checkmate Light Tactical Aircraft. How is this project progressing?

We pay great attention to the development of new technologies. In the Checkmate project, for example, we use modern supercomputer technologies, which can significantly reduce the time needed to build a prototype and ensure the start of flight tests as early as 2024. Now preparations for production of two prototypes are underway. We plan to build a total of four prototypes. Serial production of the fighter jet is scheduled to start in 2027.

During the time that has passed since the unveiling of the project, we obtained feedback from potential customers. In addition to additional requirements from them, work was carried out to optimize the cost and analyse a number of technical solutions, which made it possible to significantly increase competitiveness, commercial attractiveness, and reduce technical risks while creating the aircraft.

How do you see the future work on



#### your projects in India? It is no secret that the vast majority of the Indian Air Force fleet are Russian-made aircraft.

For quite some time we have been discussing the modernisation programme for the Su-30MKI fleet of the Indian Air Force. This is a very important issue for us. This September, I had meetings with top decision-makers from the IAF, Indian MoD and other interested parties. UAC, Rosoboronexport and other project participants pay great attention to this project. Now, we can say that we are in close contact with our Indian colleagues and are actively discussing this programme.

We also see prospects in joint work on new projects. In particular, we have repeatedly declared our interest in participating in the tender for 114 multi-role fighter aircraft. Rosoboronexport presented all relevant materials to the Indian side. We are ready to meet all the requirements not only of the RFP. but also of the DAP-2020 rules. In fact, we believe that only the Russian side is fully capable and ready to provide ToT (transfer of technology) conditions not only within this track, but also in general for various projects in the field of aircraft construction. We have successful experience in implementing programmes from the MiG-21 to the Su-30MKI, and I am sure that ToT in relation to the tender for 114 fighters is not only possible, but will be successful. Russia is the only country that is ready to transfer documentation, solutions, know-how in relation to high-tech products-very few countries in the world are really ready for this. We already have certain agreements, and

we have already started discussing the issue of localization with our Indian partner.

### How do you evaluate the effectiveness of your aircraft in real combat conditions?

Any armed conflict is a subject of an in-depth analysis in order to determine further directions for the development of technology. For example, we did such work following the results of the operation in the Syrian Arab Republic. We are also doing it now.

Currently, it seems necessary to further increase the capabilities of aircraft in terms of use of long-range weapons, electronic warfare, reconnaissance, data processing and transmission, etc. Our designers have achieved significant success in these areas, but we cannot stop there. We must move forward. We need to provide not just parity, but we strive for the superiority of our products over the products of other companies.

As for combat effectiveness, it is more appropriate to ask our colleagues in the Russian ministry of defence. We see that Su-35S and Su-30SM (an upgraded Su-30MKI) aircraft are far superior in air combat, that Su-34 destroy important ground targets with high-precision weapons, and Su-25 once again demonstrate unique combat survivability, meaning that the decisions of our designers are correct.

The work of our aircraft has repeatedly been highly appreciated by the leaders of the ministry of defense and the State; a number of pilots performing combat missions have been awarded with the highest state awards. ||

### Guest Column | Gp Capt. A K Sachdev (Retd)



### **Much Ado About Little**

Aatmanirbhar abhiyan may not translate into efficient and modern technologies for the services

THE *AATMANIRBHAR* BHARAT *Abhiyan*, unveiled by the government in May 2020 against the backdrop of the Covid-19 pandemic, ostensibly related to a financial package designed to provide an economic stimulus to a stifled economy. It essentially repackaged the old Make in India wine (which had by then turned into vinegar) into a new, more alluring, relabelled bottle.

Just as Prime Minister Narendra Modi had put his full weight behind Make in India, making it the theme for the 2015 Aero India Show and even inaugurating it (only one edition had been inaugurated by a PM before that), he personally announced *Aatmanirbhar* and made it the theme for the 2021 edition of the Aero India Show. Just before the show took off, Modi tweeted that "India offers unlimited potential in defence and aerospace. Aero India is a wonderful platform for collaborations in these areas. The government of India has brought futuristic reforms in these sectors, which will add impetus to our quest to become Aatmanirbhar."

Transcending impressive heights of sloganeering, the term has become a mantra. It is defined as a sacred, awe-inspiring utterance believed to have religious, magical or spiritual powers but recited by many without understanding its real meaning. It is now rare when there is no newspaper report or some political speech or a byte on TV, intoning *Aatmanirbhar* in strident and thundering grandiloquence, almost as if the government was employing a Goebbelsian campaign to persuade the nation about its unadulterated success. The government is convinced that this is the case. Hence, it is necessary to look at *Aatmanirbhar* in the context of indigenisation in aerospace and defence, project a whiff of the successes and peel off the fabricated cosmetics over the failures.

#### Success Stories

It would be erroneous to say that there have been no indigenous manufacturing success stories. The Vikrant set sail last month and is a true triumph, albeit with only 76 per cent indigenous content, the remaining 24 per cent, includ-





ing the all-important power plant, was imported. But even that success story was diluted somewhat in the absence of any indigenous fighter aircraft to embark on to it.

Of the three services, the navy has been the leading benefactor with several types of vessels, including nuclear submarines, being produced indigenously. The Light Combat Aircraft (LCA) is yet to become a potent combat fighter and even when it does, it will have a General Electric engine. Indeed, so will the Advanced Medium Combat Aircraft (AMCA) whenever it emerges as an operational fighter. Tata has a contract for producing C-295 transport aircraft indigenously and that is something to be proud of although the transfer of technology would be minimal.

The Indian Space Research Organisation (ISRO) has achieved spectacular successes while in the area of missiles, India is doing extremely well. Radars and sonars are also satisfying areas although the technology for an Active Electronically Scanned Array (AESA) remains elusive so far, the name Uttam already having been designated for a future indigenous AESA radar notwithstanding. The sale of the Brahmos to the Philippines in January this year is a success story, although Brahmos is not a purely indigenous venture but an Indo-Russian one. Artillery guns (155/52 mm K-9 Vajra tracked SP with 50 per cent indigenous content) and the Futuristic Infantry Combat Vehicles (FICV) are being produced in India as are some unmanned aerial vehicles with mediocre technology levels.

Other indigenously produced products include the 155mm artillery gun system Dhanush, surface to air missile (SAM) system Akash, main battle tank Arjun, T-90 tank, T-72 tank, armoured personnel carrier BMP-II/IIK, Su-30 MK1, Cheetah helicopter, advanced light helicopter, Dornier Do-228, high mobility trucks, INS Kalvari, INS Khanderi, INS Chennai, anti-submarine warfare corvette, Arjun armoured repair and recovery vehicle, bridge laying tank, weapon locating radar, Integrated Air Command and Control System (IACCS), Software Defined Radios (SDR), Opto Electronic Sights for Battle Tanks, Water Jet Fast Attack Craft, Inshore Patrol Vessel, Offshore Patrol Vessel, Fast Interceptor Boat and Landing Craft Utility.

The above list is long, but the big-ticket items are few and not commensurate with the humongous investments in the public sector. Moreover, nearly all of these pre-date Make In India and *Aatmanirbhar*. During its launch last month, Vikrant was peddled as an illustration of *Aatmanirbhar* but work on its design began in 1999 and its keel was laid in 2009, much before Modi and the self-reliance slogans. Let us now address the endemic infirmities afflicting indigenous manufacturing.

#### **Yawning Gaps**

In 1993, the Kalam Committee assessed India's Self Reliance Index (SRI)—the ratio of indigenous content of defence procurements to the total expenditure on defence procurements in a financial year—as 30 per cent. The committee offered recommendations on how the SRI could be raised to 70 per cent by 2005. But there has not been much of an upward move in the SRI for various reasons, the single major one being the internal inefficiencies of the public sector, which still rules the roost in aerospace and the defence sector.

The quality of products has been an issue. In 2009, Ecuador procured seven indigenously developed Dhruv advanced light helicopters from the Hindustan Aeronautics Limited but after four of them were involved in accidents. Ecuador unilaterally terminated the contract and initiated a legal dispute with the HAL. Fortunately, the accidental Brah-Mos missile firing from an Indian air base in March this year wherein the missile landed on Pakistani soil has not marred the sale to Philippines so far, thanks to the well-advertised action against three Indian Air Force (IAF) officers, which deflected attention away from any possible equipment malfunction.

Technology transfer has been another problem area with the public sector largely content with licence production

### Guest Column | Gp Capt. A K Sachdev (Retd)



and displaying lukewarm interest in acquiring and assimilating leading edge technology. The Su-30 MKI is based on Russian design and so is the T-90 main battle tank. The MMRCA's demise in 2015 put paid to a great opportunity India had to imbibe technology, the deal was scuttled because the HAL wanted the lion's share of the production without accepting responsibilities for quality or punctuality, conditions not palatable to Dassault. The HAL has been granted the Navaratna status with attendant benefits but customer satisfaction within Indian services is at pit level.

Indigenous efforts at producing aero engines are another sorry story. Despite the DRDO's Gas Turbine Research Establishment (GTRE) having been in existence since 1959, and an Aero Engines Research and Design Centre (AER&DC) within the HAL since 1960 for design and development of gas turbine engines, we have not been able to produce an engine for our indigenous aircraft programmes, nor is an engine on the visible horizon. Aeroengines for military and civil use remain a critical weak area. As a result, the LCA and the AMCA seem destined to be powered by General Electric engines for the next two decades at least. China also started along with us but it has employed the tactics of beg, borrow or steal while India is still on the first of these three steps. A joint venture with a foreign engine OEM is obviously the way out but it is apparent that currently no such OEM sees any benefit in giving India leading edge technology. Indian R&D, on the other hand, does not appear to be up to the task.

The Uttam AESA radar for the LCA,

AMCA and the Su-30 MKI is under development with an as yet unannounced date of operationalisation. It will reportedly have 95 per cent indigenous content but, considering the fact that details of the 5 per cent content are not in the public domain, that content must be a critical leading edge technology that no one would share with us and which would cost a huge proportion of the total cost of the radar (and not just 5 per cent).

### **Damned Lies**

The government's inspiration to promote Aatmanirbharta and to generate related news, largely with dubious newsworthiness, has a willing collaborator—an irresponsible section of the media. While the fact that more than Rs 3.5 lakh crore worth of contracts being signed by the ministry of defence (MoD) under Make in India since 2014 is quoted raucously by the media, it is silent on how many of these have fructified into deals that actually produced something worthwhile (which is almost negligible). In any case, there is no explanation of where that kind of funding was going to come from. Certainly, the defence capital budget could not have afforded it as it is not adequate to meet even existing committed expenditures. Seen in the overall context, the Rs 20 lakh crore package mentioned by Modi in his May 2020 Aatmanirbhar speech turned out to be no more than a tenth of that amount in real terms. Certainly, it was not enough to provide any impetus to stimulate growth in aerospace and defence.

In July this year, the government cleared weapon purchases worth Rs

28,732 crore for indigenous defence related products. But only an acceptance of necessity (AoN) has been given by the Defence Acquisition Council (DAC) and, going by precedents, most of these will not fructify into actual orders in this financial year or even the next. But the overzealous media has lapped up the news and presented it as if that amount has been doled out to the industry.

In July, the MoD claimed that India's defence exports had climbed to Rs 13,000 crore for 2021-22, a 55 per cent rise over the previous year. No details were given but suspicion was attracted by the statement as during the third week of March 2022, the junior minister of defence informed parliament that the figure was Rs 11,607 crore. Similar unexplained jumps have come at the last minute in previous years also. It also appears that the Rs 13,000 crore figure included the Rs 2,770 crore sale of Brahmos to the Philippines.

In other cases too the overall value of exports sums up all the contracts signed and not the invoice value of actual exports in a year for which money has been received. Grants in aid given to friendly countries also get added up to bloat this list. So are export authorisations which may or may not culminate in actual export, as also contract values for which payments may be in instalments over future years. There seems to be a policy to self-deceive and duping the public and the media is happy to unquestioningly gobble up sweet sounding statistics and regurgitate them to gullible readers. Incidentally, another nugget of information the media reported is the defence minister's statement that India's defence exports would touch Rs 50,000 crore by 2025. With the current state of affairs, that figure will be reached only by a sleight of hand on the keyboard.

### Media Hype

As a concerted campaign to keep *Aat*manirbharta alive and kicking in public perception, there is considerable hype about the memorandums of understanding being signed during the Aero India/DefExpo shows but the fact that there is no corresponding business deal ever signed is glossed over. Misleading headlines are frequent, a recent one read: 'HAL-produced gas turbines power India's INS Vikrant.' But this seeks to hide the fact that the HAL only assembled the four General Electric LM2500 gas turbines which it supplied for Vikrant.

Similarly, most news items originating from India, no doubt inspired and nudged by the government PR machinery, talk of an LCA deal with Malaysia as if it has already happened. They also fail to mention that the deal is not for the LCA or a combat aircraft per se but for the Royal Malaysian Air Force fighter lead in trainer programme. In any case, its cost (no doubt decided by the HAL based on its monopolistic mindset) is far more than its nearest competitor-the Korean FA-50. Indeed it is more than all competitors, as reported by the Janes Group. The dotted line anxiously awaits signatures. It may be recalled that the Indian Navy and private players had put their foot down in 2020 about not wanting the HAL included in the naval utility helicopter deal.

The figures for capital expenditure on defence imports have also been manipulated as the direct and indirect costs of



all services obtained from foreign entities and citizens, which ought to be excluded from total expenditure to reach indigenous content, are not being excluded. Only the cost of the main equipment is being excluded. Thus, the figures for indigenous content are dubious.

The department of military affairs has since the inception of Aatmanirbhar issued three positive indigenisation lists with 310 items (101, 108 and 101 in Lists 1, 2 and 3 respectively) and three negative import lists. In addition, the department of defence production has issued two positive indigenisation lists with special reference to defence public sector undertakings, the first of which was ridiculous even by the government's misrepresentation standards as it included a list of 2,500 items which have been indigenised. While a large section of the gullible public may have been misled into thinking that a massive indigenisation exercise had just been executed, a closer look at the list reveals that most of the items were



mundane and could be produced by even a cottage industry.

Of these, the indigenisation of 1,837 items attributed to the HAL raises questions: why has a Navaratna company into which crores have been pumped in by the government, been tasked to produce items such as nuts, bolts, bushes, screws et al and why were we waiting all these years to indigenise these. Somebody has gone to great lengths to stretch the list to the magical round figure of 2,500 (there are more than 70 types of screws with different product reference numbers). An incisive look at the contents of these lists betrays their self-glorifying motivation. Moving to the negative import lists, many of the items on these lists are already being produced in India. Naval warships, towed artillery guns, multi barrel rocket launchers and towed artillery guns, just to name a couple of them. Thus, the list is again a PR exercise.

### **Refocus Needed**

The government ought to focus more on the processes, practices, policies and principles to promote indigenisation instead of promoting just the *Aatmanirbhar* slogan. Analysts and defence watchers can see through most of the subterfuges and that detracts from approbation well deserved by the modestly few real achievements in indigenisation.

There is also the clear and present danger of the *Aatmanirbhar* tail wagging the defence indigenisation dog. Gradually, analysts are beginning to voice their fears over how the blinkered approach towards indigenisation is constraining our military to induct mediocre arms and equipment from inefficient, largely public sector indigenous sources and pushing the nation into military disadvantage vis-a-vis our two inimical neighbours. II

### By Invitation | Garuda Aerospace

### **King of Drones**

Garuda Aerospace focuses on the design, building, and customization of Drones for various applications

#### AGNISHWAR JAYAPRAKASH

GARUDA AEROSPACE IS INDIA'S LEADING DRONE tech startup focused on disrupting two major multi-billion-dollar sectors, Precision Agri Tech and Industry 4.0 upgradation. Garuda Aerospace is asset-light, recession-proof, agnostic, and focuses on eliminating labours in the agricultural field with drones. Garuda Aerospace focuses on the design, building, and customization of Unmanned Aerial Vehicles (UAVs) or Drones for various applications. Founded in 2015 with a team of 5, Garuda has scaled to 200+ member team having the largest drone fleet in India with over 400 drones and 500 pilots operating in 84 cities. Garuda Aerospace has served over 750 clients including TATA, Godrej, Adani, Reliance, Swiggy, Flipkart, Delhivery, L&T, Survey of India, SAIL, NTPC, IOCL, Smart cities, NHAI for various different projects. Expanded globally in Malaysia, Africa, South America, Panama, UAE and France, Garuda Aerospace also aims to expand in other countries. The drones are used for structural damage inspection, warehouse management, seed dropping, solar panel cleaning, project monitoring etc.

After Elon Musk liked Garuda's tweet on the solar panel cleaning drone, the startup raised Pre Series A funding of USD 1 million dollars and again within six months another round of USD 5 million dollars. Garuda Aerospace intends to expand into e-commerce, food delivery, air logistics and urban air mobility (Drone taxis) in the next one year as they have a massive global demand for their products. Garuda Aerospace applied for the PLI Scheme after the inauguration of the drone yatra. Honorable PM Narendra Modi Ji simultaneously flagged 100 drones in 100 villages across India with live tracking, data collection, and processing. Once 5G is integrated into Garuda Drones, these will act as supercomputers in villages and rural India gaining equal job opportunities and gain connectivity.

Garuda Aerospace is looking forward to constantly innovate and enhancing precision technology disruption using drones which can create a New Green Revolution in India by contributing employment to several lakh Indian youth. The Make in India startup has partnered with various global giants in the defence and aerospace sectors to advance their drone solutions. In 2022, Garuda Aerospace partnered with Lockheed Martin and Elbit Systems at the defence expo and cognizant technology solutions with introducing their Vajra Drone. Garuda Aerospace has been developing armed tactical drones, anti-drones, longrange surveillance UAVs, weaponized drones, tethered drones for communication and payload capacity drone supply delivery. Garuda Aerospace has developed all of these indigenously for the Indian defence forces in the last few years and also served the Indian Army at defence levels. Garuda Kisan Drone has played a significant role in the agriculture sector and has increased crop production, reduced manual labour, and helped farmers from harmful chemicals while spraying pesticides. Garuda Aerospace's Kisan Drone was the 1st company to get the AIF drone loan for drone buyers and the Agri Fund will help youth gain employment.

Sports, and Information & Broadcasting, Government of India, Shri Anurag Singh Thakur inaugurated India's first virtual and E-learning platform for entrepreneurs who have decided to become drone service providers. Garuda Aerospace is the first drone company to get DGCA approvals for Type Certification and Remote Pilot Training Organisation. With the Agri infrastructure fund scheme, the drones will be funded and help pilots get trained and skilled. Garuda Aerospace also participated in World Economic Forum 2023 to present the first-ever carbon-neutral drone at the Indian Sustainability Lounge, Davos.

In 2023 with the Union Budget, Garuda Aerospace will highlight many developments in the startup economy. Garuda Areospace's virtual skilling and training universities will aim to empower 1 lakh youth by providing them with training and skilling for becoming drone pilots by creating job opportunities. DGCA-approved Garuda Kisan Drones will provide data that will help farmers enhance their crop production with better Machine Learning and Artificial Intelligence solutions. The UBI-approved Kisan loan will help the agriculture accelerator fund and encourage agritech startups by helping young entrepreneurs in rural areas by distributing various agrochemicals thus further scaling it. Garuda drones will help government labs develop 5G-enabled applications.

Garuda aims to be the 1st drone unicorn startup by 2023 end. Garuda has its manufacturing facility in Chennai and Haryana and aims to sell 25,000 drones in the next 18 months, with exporting 10,000 drones to around 100 countries in the next 15 months. Garuda Aerospace will be a public company in the next 2 years.

On 6th December 2022, Union Minister for Youth Affairs &

(The writer is Founder and CEO, Garuda Aerospace)

### NEWS HAL Leads the Way to *Aatmanirbhar* in Air



HAL displayed an 'Aatmanirbhar Formation' flight of 15 helicopters consisting of all variants of Advanced Light Helicopter (ALH), 'Prachand' Light Combat Helicopter, and Light Utility Helicopter (LUH). The fixed-wing front witnessed LCA twin seater variant, Hawk-i, Intermediate Jet Trainer (IJT) and Hindustan Turbo Trainer (HTT)-40 aircraft. At the show, HAL showcases its full-spectrum training capabilities and displays for the first time, the scale model of Hindustan Lead in Fighter Trainer (HLFT)-42. HLFT-42 is the 'Next Gen Supersonic Trainer' that will play a critical role in modern combat aircraft training with state-of-the-art avionics like Active Electronically Scanned Array (AESA), Electronic Warfare (EW) Suite, Infrared Search and Track (IRST) with Fly by Wire control (FBW) system. HAL's display theme at Aero India is 'Innovate. Collaborate. Lead'.

HAL's major attraction at its indoor pavilion (HALL-E) is the scale model of Indian Multi Role Helicopter (IMRH), Next-generation HLFT-42 and models of LCA Mk-2, Hindustan Turbo-shaft Engine-1200, RUAV, LCA Trainer, Hindustan-228 among others. The outdoor display adjacent to HAL stall features rotary wing products LUH and ALH Medical Intensive Care Unit (MICU) variant. On static display are ALH, Dornier, Hawk-i, HTT-40, in addition to civil certified Do-228.

The central theme of the India Pavilion is fixed wing platforms. An actual LCA-Tejas in FOC configuration is the centrepiece along with various associated structural modules, simulators, systems (LRUs) etc., being produced by private partners. There is dedicated space for defence space, new technologies and UAV which will give an insight about the growth of India in each sector. II

### HAL Completes Delivery, ALH to Fly in Mauritian Skies

HAL successfully handed over an Advanced Light Helicopter (ALH) to the government of Mauritius at Helicopter Division on 10 February 2023.

General Manager, Helicopter Division, Nikhil Dwivedi handed over the Certificate to Commissioner of Police, Mauritius Police Force (MPF), A.K. Dip in the presence of the Director (Operations), HAL, E P Jayadeva and CEO (HC), S Anbuvelan among others.

Speaking on the occasion, Jayadeva said HAL has handed over the helicopter way ahead of the schedule. He said that this order was in line with the government's vision to boost defence exports to friendly foreign countries and that the handing over of export helicopter had further bolstered the ties between the two countries. "The ALH Mk-III helicopter will meet the operational requirements of Mauritius Police Force (MPF). The helicopter with its state-of-the-art equipment will further enhance the operational requirements of the MPF," he added.

Dip said that the induction of a new helicopter into the stables of Mauritius Police Force would enhance the aerial capabilities of Mauritius Police. "The helicopter will contribute immensely in ensuring the territorial integrity and enhancing the speed and effectiveness of the police intervention during critical incidents and disasters," he said.

Anbuvelan said HAL and the government of the Republic of Mauritius share a strong business relationship spanning over three decades, with HAL-manufactured helicopters already in service in Mauritius. He assured that HAL would provide all the necessary technical, logistic, and mainte-



nance support for ALH Helicopters in Mauritius.

HAL had signed a contract with the government of Republic of Mauritius in January 2022 for export of one ALH Mk-III to Mauritius Police Force. ALH Mk-III is a multi-role, multi-mission versatile helicopter in 5.5 tonne category. HAL, in a press release said that the helicopter had proven its mettle in various utility roles, including numerous life-saving missions during natural calamities in India and abroad. More than 335 ALHs have been produced till date, logging a cumulative of more than 3,75,000 flying hours. HAL also ensures technical assistance and product support to the customer to ensure healthy serviceability of the helicopter. II

### **Picture Story**



### Aero India 2023 Opens

Dazzling air display gives a flying start to the show













### **By Invitation** | Thales





### In Full Force

Thales to Focus on the Company's Progress Towards 'Make in India for India and for the World'

AFFIRMING ITS PARTNERSHIP WITH INDIA, THE FRENCH company said that Thales' 'Make in India' programme is growing every year, helping Indian industry to play a greater role in world markets. The Group has steadily built advanced in-country capabilities across manufacturing, critical systems and services in India through local teams and collaborations.

Working today with 75 suppliers, generating more than 1900 indirect jobs in India, Thales has expanded locally with joint ventures and other partnerships, such as with Bharat Dynamics Limited to manufacture 60 percent of the Laser Beam Riding MAN-PAD (LBRM) system, a top product that Thales will display at the show alongside other defence equipment with local content.

Thanks to its growing indigenous engineering capability, Thales in India now counts more than 1800 employees including 1400 engineers in its two global Engineering Competences Centres, located in Bangalore and Noida. These centres focus on hardware, software and systems engineering capabilities for both the civil and defence sectors, serving global needs. In support of this expansion, Thales HR executives will be present during the public days to meet the Indian engineering talent at the Show and share career opportunities with them.

### At Aero India 2023

Thales provides a range of products and services to aid the Indian armed forces in achieving operational superiority. Building on the four major pillars of digital technology: connectivity, big data, artificial intelligence and cybersecurity, Thales' solutions ensure mission readiness and simplify complexity so that military personnel can focus on strategic and operational decision-making.

At Aero India 2023, Thales will exhibit its air defence capacities from sensors to effectors. As a systems integrator, the Group will showcase its full range of radars as well as leading very short-range air defence systems including Laser Beam Riding MANPAD, among others.

Thales will showcase the best of its airborne optronics capability: the 2-in-1 targeting & reconnaissance pod TALIOS (Targeting Long-range Identification Optronic System) that delivers unmatched image quality.

On the connectivity side, Thales will introduce SYNAPS A, the airborne member of the SYNAPS software-defined radio family designed to support battlespace digitisation and C4I systems, and also Identification Friend of Foe (IFF).

Under the navigations segment, the TopAxyz inertial navigation system for air, naval and land transport will be featured.

Thales covers the entire spectrum of maritime security and naval combat, from the open ocean to the shorelines. The Group is positioned across the entire value chain for electronic equipment (radar, sonar, effectors, communications, electronic warfare, optronics), command and combat systems and services.

For the Indian Navy, Thales will showcase Sonoflash, a new generation of sonobuoy that strengthens anti-submarine warfare capabilities.

Thales has also been actively contributing to India's aviation sector with its services and solutions for airlines, Airports Authority of India, among others. At this year's show, Thales will feature AVANT Up, its latest evolution of industry leading inflight entertainment (IFE) solutions.

Another striking feature will be the presentation of our earth observation space capabilities.

With the drone ecosystem gaining momentum in India, Thales will present its portfolio of solutions including drones such as Spyranger, counter-UAV solutions that detects, classifies and neutralises micro and mini-drones to protect people, secure critical infrastructure and events in full compliance with national and international regulations.

"As we celebrate 70 years in India, Thales is eager to pursue its long-standing commitment to partner with India in its big ambitions including the 'Aatmanirbhar Bharat' vision. We are fully committed and mobilised to continue supporting the modernisation and indigenisation efforts that are underway in the Indian aerospace and defence sector," Vice President and Country Director—India, Thales, Ashish Saraf. **I** 



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