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"WE SHOULD PUT ALL OUR EFFORTS INTO BEING SELF-RELIANT ON AN AERO-ENGINE"
– AIR MARSHAL TEJINDER SINGH
DEPUTY CHIEF OF THE AIR STAFF
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C-390, A NEXTGEN MULTI-ROLE AIRCRAFT, CONTINUED ITS GROWING POPULARITY IN 2024 WITH A STELLAR PERFORMANCE, PICKING UP ORDERS FROM NATO MEMBER AND ASIAN COUNTRIES

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COVER IMAGE

With a focus on innovation and flexibility, Embraer Defense & Security, and its flagship C-390 Millennium, are delivering state-of-the-art solutions spanning air, land, sea, space, and cyber spheres, catering to the dynamic requirements of defence worldwide.

(***Cover Photo**: Embraer / X)*

COVER DESIGN BY: *SP's Team*

SPACE

MILITARY

6th Gen Fighters

REGULAR DEPARTMENTS

NEXT ISSUE: *MEBAA 2024 Report*

As 2024 draws to a close, we look at the ever-evolving geopolitical landscape that has underscored the critical role of defence as a technological driver for nations worldwide. The lessons are clear - self-reliance, innovation, and strategic foresight must guide a nation's aerospace and defence endeavours.

YEAR 2024 WAS A GOOD YEAR FOR EMBRAER DEFENSE & Security with significant milestones, affirming its position as a leading force in the global defence aviation market. Its flagship military platforms—the C-390 Millennium and the A-29 Super Tucano—are redefining the standards for versatility, performance, and cost-effectiveness. This issue features the portfolio of the Embraer Defense & Security that exemplifies innovation and versatility, delivering advanced solutions across air, land, sea, space, and cyber domains to meet the evolving demands of global defence.

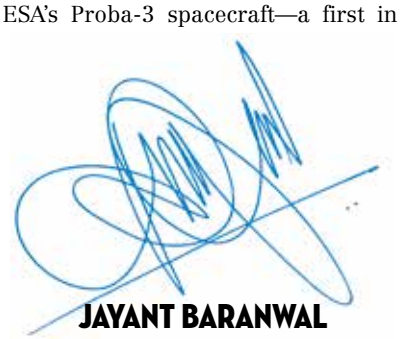
Recently China rattled the global aviation community when it flew two 6th Generation stealth aircraft. Although experts are still to pass any judgement on these aircraft, what is clear is that China has usurped everyone including the US and Europe. In his analysis of the same, Air Marshal Anil Khosla (Retd) writes about China's progress in sixth-generation aviation. China's unveiling of its sixth-generation fighters, J-36 and J-50, alongside the "White Emperor" at the Zhuhai Airshow, signals its ambition to rival the US in airpower projection. These developments challenge traditional air superiority in the Indo-Pacific and demand a proactive response from India. Advancing indigenous aerospace R&D is no longer optional—it is a strategic imperative. Another article by Air Marshal R.G.K. Kapoor (Retd) further extends these arguments on the Chinese sixth generation stealth fighters and underlines the key question as to whether the Chinese can effectively and efficiently employ these platforms in a highly contested and networked air space where decision making is delegated.

Another article by Manish Kumar Jha talks about the critical gaps in Indian Air Force fleet, prompting the Ministry of Defence to form a committee to address fighter squadron shortfalls and explore Unmanned Combat Aerial Vehicles. With concerted efforts, investment in indigenous technology, and strategic acquisitions, the IAF can emerge stronger, ensuring that India remains secure in an increasingly complex and volatile world.

India's pursuit of an indigenous aero-engine continues to dominate discourse, as highlighted by Air Marshal Tejinder Singh, DCAS, who emphasised the necessity of a national mission to achieve self-reliance in this domain. Despite initial progress with the Kaveri engine, challenges persist, especially in meeting the thrust requirements for advanced platforms like the Tejas Mk2 and AMCA. A national focus on R&D and innovative technologies is imperative to secure India's future in aerospace and defense. The possibilities are discussed at the TDF DRDO Conference where Manish Kumar Jha moderated a session and has penned down insights from the discussions for the magazine.

Amid these challenges, the IAF's transport fleet is evolving. Joseph Noronha further talks about transformation of the transport fleet in his article. The induction of the Airbus C295MW and ongoing discussions around the Multi-Role Transport Aircraft (MTA) reflect efforts to bridge gaps between existing platforms like the C-17 Globemaster III and the C-130J Super Hercules. The significance of transport aircraft extends beyond warfighting, offering strategic value in disaster response, humanitarian aid, and rapid troop deployment.

India's space sector also marked a milestone with the PSLV-C59 mission, launching ESA's Proba-3 spacecraft—a first in precision formation flying. A report on the mission by Ayushee Chaudhary is included in this issue. All this and more in this issue of *SP's Aviation*. Welcome aboard and we wish you many happy landings!



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ARTIST'S VIEW OF PROBA-3 ON AN ISRO PSLV-XL LAUNCH VEHICLE. PROBA-3 IS ESA'S – AND THE WORLD'S – FIRST PRECISION FORMATION FLYING MISSION.

ESA'S PROBA-3 MISSION TAKES OFF ON ISRO'S PSLV

PSLV-C59 vehicle carried European Space Agency's Proba-3 spacecraft into a highly elliptical orbit as a dedicated commercial mission of NSIL, the commercial arm of ISRO

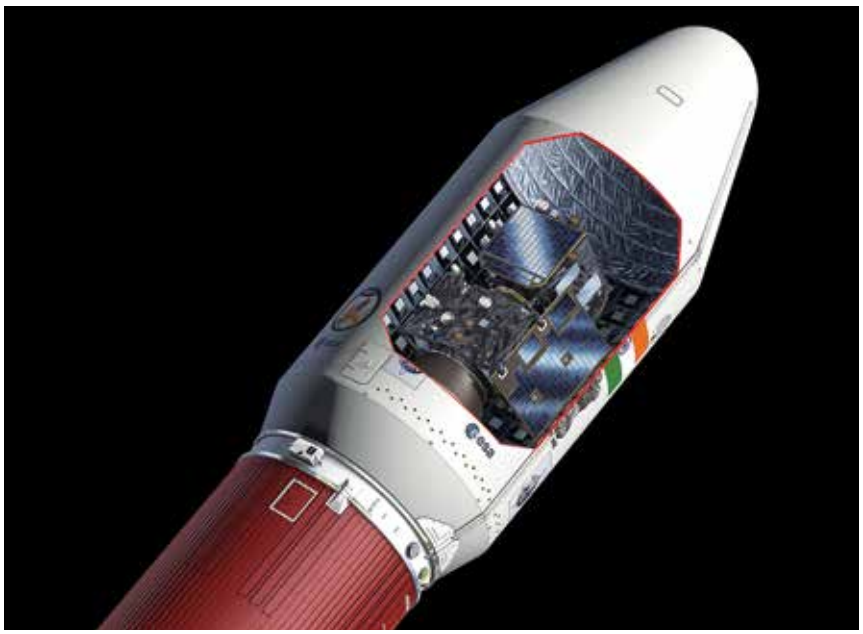
By **AYUSHEE CHAUDHARY**

PHOTOGRAPH: ESA / P. CARRIL

APPROACHING THE END OF THE YEAR ON A HIGH NOTE, QUITE literally, another rocket took to the skies from the Indian soil. On December 5, 2024, the Polar Satellite Launch Vehicle (PSLV-C59) of the Indian Space Research Organisation (ISRO), added another milestone to its record by successfully launching the European Space Agency's (ESA) Proba-3 mission.

Launched from the First Launch Pad (FLP), Satish Dhawan Space Centre (SDSC-SHAR), Sriharikota, PSLV-C59/Proba-3 mission successfully achieved its launch objectives. PSLV-C59 vehicle carried Proba-3 spacecraft into a highly elliptical orbit as a dedicated commercial mission of NewSpace India Limited (NSIL), the commercial arm of ISRO. This marked a landmark moment for NSIL, the commercial arm of ISRO, as it solidified its position as a key player in global commercial satellite launches and reinforced PSLV's reliability for complex orbital deliveries.

Proba-3 is an In-Orbit Demonstration (IOD) mission of ESA with the goal to demonstrate precise formation flying. A pair of satellites were flown together, maintaining a fixed configuration as if they were a single large rigid structure in space, to prove innovative formation flying and rendezvous technologies in space.



(LEFT-RIGHT) PROBA-3 WITHIN PSLV-XL LAUNCHER. THE MISSION WILL DEMONSTRATE FORMATION FLYING IN THE CONTEXT OF A LARGE-SCALE SCIENCE EXPERIMENT.

"PSLV-C59 has successfully soared into the skies, marking the commencement of a global mission led by NSIL, with ISRO's technical expertise, to deploy ESA's groundbreaking Proba-3 satellites. A proud moment celebrating the synergy of international collaboration and India's space achievements," ISRO said in its social media post.

ISRO Chairman S. Somanath, speaking from the control room after the successful launch, said, "The PSLV C59 Proba-3 mission is successfully accomplished. The spacecraft has been placed in the right orbit, which is a very highly elliptical orbit for almost 600 km perigees, which is the closest point to Earth, and 60,000 km at its apogee, the farthest point, and an inclination of 59 degrees has been precisely achieved by PSLV in its 61st mission.

Proba-3 lifted off on a four-stage PSLV-XL rocket from India. Stacked together, the two satellites separated from their upper stage about 18 minutes after launch. The pair will remain attached together while initial commissioning takes place, overseen from mission control at the European Space Security and Education Centre, ESEC, in Redu, Belgium.

THE PROBA-3 MISSION: A REVOLUTION IN FORMATION FLYING

Proba-3 is ESA's first precision formation-flying mission and a global first in demonstrating the potential of two satellites working as one. The mission consists of two spacecraft—the Coronagraph Spacecraft (CSC) and the Occulter Spacecraft (OSC)—designed to fly in tandem 150 meters apart. Together, they form a single large virtual structure capable of producing artificial solar eclipses in orbit. This enables the CSC to observe the Sun's faint corona, the outermost part of the solar atmosphere, in unprecedented detail. The mission addresses critical gaps in solar observation, tracking phenomena such as Coronal Mass Ejections and the acceleration of the solar wind.

> The Proba-3 mission is ESA's first precision formation-flying mission and a global first in demonstrating the potential of two satellites working as one

ESA's twin Proba-3 platforms will perform precise formation flying down to a single millimetre, as if they were one single giant spacecraft. To demonstrate their degree of control, the pair will produce artificial solar eclipses in orbit. The OSC and the CSC, align precisely to cast a shadow that blocks the Sun's bright disk, enabling unobstructed observation of the solar corona. Without this perfect alignment, the Sun's light would overwhelm instruments, obscuring corona studies.

Proba-3 mission manager Damien Galano adds, "I'm grateful to ISRO for this picture-perfect ascent to orbit. Now the hard work really begins, because to achieve Proba-3's mission goals, the two satellites need to achieve positioning accuracy down to the thickness of the average fingernail while positioned one and a half football pitches apart."

Proba-3 will function as an orbital laboratory, demonstrating acquisition, rendezvous, proximity operations and formation flying, while validating innovative metrology sensors and control algorithms, opening up novel methods of mission control. The two satellites will adopt a fixed configuration in space, 150m apart while lined up with the Sun so that OSC blocks out the brilliant solar disk for the CSC. This will open up continuous views of the Sun's faint corona, or surrounding atmosphere, for scientific observation. Basically, Proba-3 employs the two satellites to create artificial solar eclipses for six hours at a time. This configuration blocks the Sun's disk to allow close-up observations of the faint solar corona, addressing a significant observational gap.

The satellites operate at a high altitude of over 60,000 km to minimise perturbing forces like Earth's gravity and atmospheric drag, reducing the

PHOTOGRAPHS: ESA / P. CARRIL, ISRO

PROBA-3 SEPARATION FROM PSLV-XL UPPER STAGE

PHOTOGRAPH: ESA / P. CARRIL

WHAT ARE THE PROBA SERIES OF MISSIONS?

THE PROBA MISSIONS ARE A SERIES OF IOD (in-orbit demonstration) missions from the European Space Agency, for demonstrating and validating new technologies and concepts in orbit. They are based on small satellites, embarking payload and instruments to deliver actual data to users to demonstrate a new capability. They are developed under the General Support Technology Programme (GSTP) of ESA.

- Proba-1, launched in 2001, an Earth observation satellite with advanced on-board autonomy and embarked an innovative hyperspectral instrument. It has been operational for more than 20 years.
- Proba-2, launched in 2009, is observing the Sun, with more than 20 technology payloads and scientific instruments.
- Proba-V (for Vegetation), launched in 2012, it flies an innovative Earth imager, for multi-spectral global vegetation mapping.
- Proba-3, launched in 2024, will demonstrate precise formation flying by flying two satellite to achieve observation of the Sun's inner corona. SP

propellant needed for formation maintenance. The solar corona holds critical insights into solar weather phenomena like coronal mass ejections. Proba-3's ability to create extended eclipses over six hours per orbit fills a crucial observational gap, offering unprecedented views of this enigmatic region, which previously required rare and brief total solar eclipses for study.

The mission's innovative design, involving millimetric precision in formation flying, allows continuous observation of the inner corona, enabling breakthroughs in understanding solar dynamics and improving our ability to monitor and predict space weather events.

"We are honoured that ESA entrusted NSIL, with its Proba-3 mission, and we are extremely satisfied to have delivered the satellites precisely into their designated orbit," remarked Radhakrishnan Durairaj, Chairman and Managing Director of NSIL. "This is an extremely ambitious mission, with an ambitious orbit to go with it: the satellites have been placed into a highly elliptical orbit which extends more than 60,500 km from the surface of Earth. Reaching this orbit required the most powerful PSLV-XL variant of our launcher, equipped with additional propellant in its six solid rocket boosters."

Led by Sener in Spain and involving 14 ESA Member States and Canada, Proba-3 leverages ESA's General Support Technology Programme to integrate cutting-edge technologies, supported by Airbus Defence and Space, Redwire Space, and other key European players. The mission is expected to separate the spacecraft for individual testing early next year, with operational observations commencing in four months.

This novel approach of this mission has significant implications for the future of space missions, including the possibility of deploying constellations of small satellites to create virtual telescopes or advanced sensors.

INDIAN-EUROPEAN COLLABORATION

The Proba-3 mission exemplifies international collaboration in space technology. NSIL's partnership with ESA brought together 14 European countries and Canada, with each contributing expertise to the spacecraft's design and operations. The mission's success underscores India's growing capability in commercial satellite launches and its contribution to global space science. Prior to this, ESA had even launched the Proba-1 mission as well on ISRO's PSLV in 2001.

India's PSLV-XL launcher was chosen since the lift required to place the combined Proba-3 satellites (550 kg) on their desired highly elliptical orbit is above the capability of ESA's Vega-C launcher, while Ariane-6 would be too costly for a tightly-budgeted technology demonstration mission.

With Proba-3, both India and Europe have taken a significant step toward redefining what's possible in orbit. This mission not only strengthens India's reputation in the global launch market but also sets the stage for future innovation in precision space operations.

"The Proba-3 was important for us because this is a mission, which is looking at the heliophysics and we have a strong science group within the country who have collaboration with the scientists in ESA. We have a solar mission Aditya L1, which is working along with this satellite and we will give a fantastic science outcome in the days to come," said the ISRO Chairman.

TECHNOLOGICAL INNOVATIONS

Proba-3 represents a confluence of cutting-edge technologies:

- Formation Flying: The mission is a testbed for advanced rendezvous and proximity operations, with positioning accuracy at millimeter levels.
- Solar Observation: The mission's ASPIICS coronagraph, developed by Belgium's Royal Observatory, fills observational gaps between 1.1 and 3 solar radii. This data is crucial for understanding solar phenomena that affect space weather.
- Autonomous Operations: Proba-3's onboard systems, developed by Redwire Space and GMV, allow for real-time adjustments, a step forward in autonomous satellite operation.

Proba-3 paves the way for innovative satellite missions, proving that complex scientific goals can be achieved through smaller, collaborative platforms. SP

CHINA'S 6TH-GEN F-36 STEALTH FIGHTER TAKES MAIDEN FLIGHT OVER CHENGDU

DECODING CHINA'S SIXTH-GENERATION FIGHTER AIRCRAFT PROGRAMME

China's progress in sixth-generation aviation underscores its ambitions to project power far beyond its borders, influencing regional security dynamics and exacerbating the arms race in Asia

By AIR MARSHAL ANIL KHOSLA (RETD)

PHOTOGRAPH: ASDS MEDIA

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IN NOVEMBER 2024, AT THE ZHUHAI AIR SHOW, CHINA unveiled a full-scale model of its sixth-generation fighter, named the "White Emperor" or "Baidi." This aircraft is part of Project Nantianmen's research initiative exploring future aviation technologies. However, on December 26, 2024, pictures and videos of the flight of two advanced prototypes were shared on social media. These are considered to be its sixth-generation fighter jets but seem to have little similarity with the "White Emperor" model shown at Zhuhai Airshow 2024. This milestone underscores China's advancing aerospace capabilities and ambition to compete with global superpowers in the future of air combat.

China has made significant strides in developing cutting-edge military technologies in the ongoing arms race among world powers. China's Sixth-Generation Aircraft programme has generated considerable buzz in defence and aviation circles. While official reports and state-controlled media often paint a picture of cutting-edge technology and a new era of Chinese air dominance, the hype surrounding these aircraft usually exceeds the tangible realities. At the heart of China's push for a sixth-generation fighter is surpassing existing US and Russian technologies by integrating artificial intelligence, enhanced stealth, hypersonic speeds, and advanced weaponry. However, the actual capabilities of these aircraft, still shrouded in secrecy, remain uncertain. Understanding the gap between expectation and reality is crucial for evaluating the true impact of China's ambitions on global aviation and defence strategies. The successful development and deployment of these sixth-generation fighters could potentially shift the balance of power in the global defence landscape, influencing the strategy and capabilities of other major powers.

THE PROTOTYPES

Two advanced jet prototypes were observed flying over China's airspace, marking a significant milestone in China's military aviation development.

The first (the Cheng-6 on Chinese social media), developed by Chengdu Aircraft Corporation, features a tailless, diamond-shaped modified delta wing design, enhancing its stealth capabilities and aerodynamic efficiency. The airframe is optimised for internal payload storage and has an underside reminiscent of the YF-23. Notably, this aircraft is believed to utilise a unique three-engine configuration, with air intakes positioned atop the fuselage. Underpowered Chinese engines may have driven the apparent three-engine design, or the third engine could be for high-speed space operations. The aircraft will likely have a high fuel/weapons load and a significant range. Its design suggests a focus on long-range missions and advanced stealth features. The design configuration indicates its potential use in roles requiring long-range missions, high-speed flight, and significant payloads, such as heavy tactical fighter or regional bomber missions.

The second prototype (Shen-6), attributed to Shenyang Aircraft Corporation, also exhibits a tailless design with a twin-engine configuration but a more conventional layout than its Chengdu counterpart. It has a few features similar to those of the US F-22 and F-35 aircraft. This aircraft emphasises stealth characteristics, aiming to minimise radar detection. It could be a low-observable F-35-style multi-role fighter featuring higher manoeuvrability without sacrificing range. It may be a mass-manufacturable second-tier fighter to complement the J-20. The Shen-6's design characteristics indicate it could be suited for multi-role operations, including carrier-based missions.

The simultaneous development of these two prototypes indicates China's commitment to advancing its aerial combat capabilities and achieving a diversified fleet of next-generation fighter jets. Although this could be a case of two separate companies bidding on the same project, the apparent Maximum Take-off Weight (MTOW) difference may imply different mission roles. The two prototypes seem complementary rather than competitive, with the Chengdu prototype's design more consistent with

CHINESE J-35A AT ZHUHAI AIRSHOW 2024

PHOTOGRAPH: ASDS MEDIA

characteristics attributed to the JH-XX tactical fighter-bomber concept. In contrast, the Shenyang prototype features seem to enhance operational flexibility. Both aircraft align with principles associated with sixth-generation fighter designs, including advanced stealth, and in all probability, are capable of integration with unmanned systems and networked combat capabilities. It remains unclear whether these are crewed, optionally crewed, or intended to be uncrewed but temporarily feature pilots for the test phase only.

HYPE VS. REALITY

The Chinese Ministry of Defence and state media have not officially confirmed the aircraft's specifications or capabilities. This lack of official confirmation is consistent with China's typical approach to military advancements, where details are often withheld until the government deems it appropriate to release information. The controlled dissemination of information seems intentional, aiming to generate discussion and speculation about China's advancements in military aviation. Without official confirmation, the aircraft's true capabilities and purpose remain speculative. The Chinese Ministry of Defence's silence leaves room for various interpretations and analyses, making it challenging to ascertain the exact nature of the aircraft and its implications for global military dynamics.

Assessing the reality of China's sixth-generation fighter aircraft programme amidst the hype requires a meticulous analysis of the available evidence, China's broader military capabilities, and historical trends. This scrutiny is essential to separate the facts from the exaggerations and understand China's ambitions' actual impact on global aviation and defence strategies.

Observable Reality. Two distinct sixth-generation prototypes—one from Chengdu Aircraft Corporation and another from Shenyang Aircraft Corporation—have reportedly conducted flights. Videos and imagery on social media and analysts substantiate these claims. China has made significant strides in aerospace technologies, such as radar-absorbing materials, hypersonic weapons, and advanced sensors. These technologies align with sixth-generation fighter requirements. The prototypes and China's technological advances are actual. China is progressing quickly in aerospace capabilities, and its sixth-generation fighter programme is a credible effort to develop cutting-edge aircraft. These aircraft designs appear consistent with sixth-generation fighter concepts, i.e. Tailless shapes, advanced stealth features, and potential for artificial intelligence integration. The Chengdu prototype's three-engine configuration suggests focusing on greater thrust and energy generation, possibly for directed-energy weapons or advanced sensor systems.

Likely Exaggerations (Hype). China's military often uses high-profile unveilings to signal technological prowess, which may not reflect immediate readiness. Publicising advanced aircraft boosts national pride and deter adversaries by creating the perception of parity or superiority in air combat. Historically, Chinese designs often take cues from existing foreign designs. The speed of development may indicate reliance on reverse-engineered components or speculative technologies. Some claims about capabilities—such as seamless artificial intelligence integration, swarm control of drones, or fully functional directed-energy weapons—are unverified and might be aspirational rather than operational. China's ability to mass-produce sixth-generation fighters remains uncertain, particularly under international sanctions and technological bottlenecks (e.g., domestic jet engine reliability).

COMPARATIVE CAPABILITY ANALYSIS

The global race to develop sixth-generation fighter aircraft is focused on pushing the boundaries of air combat capabilities. Comparing China's emerging sixth-generation fighters with programmes in the US, Europe, and Russia highlights differences in strategy, technology, and priorities. Subsequent paragraphs compare their core specifications and capabilities.

FUTURE COMBAT AIR SYSTEM (FCAS) IS A COLLABORATIVE EFFORT BY FRANCE, GERMANY, AND SPAIN TO DEVELOP A SIXTH-GENERATION FIGHTER

Stealth and Aerodynamics. Prototypes from Chengdu and Shenyang feature tailless designs to reduce radar cross-section and improve stealth. The Chengdu version reportedly has a diamond-shaped delta wing with three engines, possibly enhancing agility and energy management. They prioritise passive stealth with an emphasis on coatings and shaping. US (NGAD Programme) will likely incorporate multi-spectral stealth (radar, infrared, and acoustic) with advanced materials and active stealth systems. It may feature variable geometry wings and extreme agility enhancements. The Europe (FCAS/Tempest) is focused on stealth but with added emphasis on low observability across electromagnetic and thermal spectrums and highly modular designs to adapt to mission needs. The Russia (MiG-41, PAK DP) emphasises speed and high-altitude performance over traditional stealth. Claims include hypersonic capabilities.

Sensors and Avionics. China emphasises sensor fusion and integration into battlefield networks. It is likely to feature early AI implementations for decision support. Its prototypes reportedly

PHOTOGRAPH: AIRBUS

focus on long-range sensor detection and electronic warfare. The US programme includes advanced sensor fusion with real-time data sharing across multiple platforms backed by AI. They are likely to incorporate advanced quantum radars and resilient communication systems. The European FCAS emphasises sensor fusion and cooperative engagement capabilities (e.g., directing drone swarms). Russia has a less explicit focus on advanced sensor integration. Historically, it lacks behind in electronics but emphasises long-range detection and targeting systems.

Weapons Systems. China will likely include long-range missiles, hypersonic weapons, and directed-energy systems (e.g., lasers), integrating unmanned wingmen and drone swarms to amplify firepower. In the US design, the directed-energy weapons (laser and microwave systems) are expected to feature prominently along with advanced air-to-air and air-to-ground missile systems, likely with hypersonic and loitering capabilities. FCAS emphasises collaborative engagement with unmanned platforms and electronic warfare capabilities. The Russian design is expected to focus on hypersonic missiles and high-speed intercept weapons.

TEMPEST IS A UK-LED PROGRAMME WITH ITALY AND SWEDEN TO DEVELOP A SIXTH-GENERATION FIGHTER JET

AI and Autonomous Capabilities. China will likely resort to early AI adoption for decision-making and data processing. It is likely to feature semi-autonomous operations and control over unmanned systems. US has leadership in AI with autonomous systems capable of executing combat missions and controlling drone swarms. It is expected to integrate it with cloud-based battlefield management systems. The European focus is on cooperative AI, particularly in managing multi-platform networks (fighters, drones, and ground systems). Historically, Russia is less advanced in AI integration but may prioritise simpler, rugged autonomous features.

Range and Endurance. China's three-engine design of one prototype suggests a focus on extended range and mission endurance. It likely aims to dominate the Western Pacific and beyond. The US programme is designed for global reach with aerial refuelling and extended-range combat. European effort is primarily intended for regional missions within Europe but has some extended capabilities for international deployment. Russia is likely to prioritise high-speed intercept missions over endurance.

COMPARATIVE STRENGTHS AND WEAKNESSES

The strengths and weaknesses of each programme are summarised below:

China. Its strengths include rapid development, a focus on stealth, long-range operations, and integration with drone swarms. Its weaknesses are AI maturity, engine reliability, and dependency on reverse engineering.

USA. The US Strengths include leadership in AI, stealth, weapons systems, and operational readiness. However, high costs and complexity could slow down production.

Russia. Russia's strengths are its hypersonic missile focus, speed, and ruggedness. However, it lags in stealth and AI capabilities and has limited resources.

Europe. Their strengths are cooperative AI, adaptability, and strong industrial collaboration. Weaknesses include budget constraints and potential delays due to multinational coordination.

TIME LINES: TECHNOLOGY TO CAPABILITY

A prototype's first flight is a significant step, but operational readiness involves years of testing, integration, and production. While China has demonstrated rapid progress in its sixth-generation fighter programme, several factors will determine how close it is to operational deployment.

Development Timeline. The maiden flights of two sixth-generation prototypes indicate the early stages of development. Historically, it takes a decade or more from prototype testing to fielding a combat-ready squadron.

Testing and Iteration. Extensive testing is required to validate the aircraft's performance, systems integration, and combat effectiveness. Early prototypes may evolve significantly before final production models.

Technological Maturity. Reliable, high-thrust engines capable of supercruising and supporting advanced systems are critical. China's WS-15 engine for the J-20 has reportedly faced delays, suggesting potential challenges in developing next-generation engines for sixth-generation aircraft. Sixth-gen fighters must leverage advanced sensor fusion, artificial intelligence, and networked warfare capabilities. Developing and operationalising these technologies will take time. While Directed-Energy Weapons and Drone Swarms are touted as potential features, achieving battlefield-ready versions of such systems remains a significant challenge globally, not just for China.

Production and Logistics. Building a squadron requires mass production of advanced components, including stealth materials, avionics, and engines. China has strong manufacturing capabilities but may face bottlenecks due to sanctions and technological dependencies.

Training and Support Infrastructure. Pilots, ground crews, and logistical support systems must be trained and established to operate and maintain sixth-gen fighters effectively.

PHOTOGRAPH: BAE SYSTEMS

Strategic Drivers. China's ability to accelerate development depends on how aggressively it prioritises this programme over others, including improvements to existing platforms like the J-20 or J-31. Rising tensions with the US and its allies could push China to field these fighters sooner, even in limited numbers, for deterrence purposes.

Current Estimate. A cautious view suggests that while China is advancing rapidly, its sixth-generation fighters may still be years away from full operational deployment, with significant technological and logistical challenges to overcome. The US F-35, for instance, first flew in 2006 but reached initial operational capability (IOC) only in 2015. Based on available information and historical parallels, if China follows a similar timeline, its sixth-generation fighters could achieve IOC by the early to mid-2030s. China could field a symbolic squadron earlier, but these would likely have been pre-operational units used for further testing and refinement rather than full combat readiness. A fully Operational Squadron could be formed earliest by 2035, assuming no significant development, production, or integration setbacks are faced.

BROADER IMPLICATIONS

The development of sixth-generation fighter aircraft positions China at the forefront of the global race for sixth-generation fighter technology, potentially challenging the air superiority of other nations and reshaping the dynamics of modern aerial warfare. These developments significantly affect regional security dynamics, particularly in the Far East and South Asia.

Broader Geopolitical Implications. A successful sixth-gen programme would boost China's confidence in its ability to deter external intervention, particularly by the US, in disputes over Taiwan or the South China Sea. It may embolden China to pursue a more assertive posture in regional disputes. The US will likely increase military support to its allies (Japan, South Korea, Taiwan, and potentially India) to counterbalance China's growing air power. Regional powers are likely to boost defence budgets to acquire or develop next-gen capabilities, exacerbating the arms race in Asia. Smaller Southeast Asian nations may seek advanced air defence systems to avoid vulnerability.

Overall Regional Impact. China's advancement in sixth-generation aircraft challenges the air superiority traditionally held by the United States and its allies in the Indo-Pacific. Once operationalised, these fighters could extend China's ability to project power far beyond its borders, including contested areas like the Taiwan Strait, the South China Sea, and the East China Sea. A credible sixth-generation capability is a deterrent, raising the risks for nations contemplating countering China's military actions in disputed regions. It also strengthens China's bargaining power in regional and global negotiations. This development could trigger a technological and military response from neighbouring countries, prompting increased defence spending and collaboration with the US or European powers.

IMPLICATIONS FOR SPECIFIC NATIONS

Japan. Japan faces heightened security risks in the East China Sea, particularly around the disputed Senkaku Islands, as advanced Chinese aircraft could dominate contested airspace. China's long-range strike capabilities threaten Japan's strategic assets and population centers. Japan has already committed to the F-X programme, a sixth-generation fighter co-developed with the UK (Tempest) and Italy. This programme may accelerate to counter China's advancements. It may strengthen the US-Japan alliance, hosting more advanced US assets like the F-35 and NGAD platforms.

South Korea. The Korean Peninsula's proximity to China makes South Korea vulnerable to Chinese air power in any regional conflict. Chinese sixth-generation fighters could neutralise South Korea's current air force, including its F-35 fleet. South Korea may fast-track its KF-21 Boramae fighter programme and consider deeper integration with US defence systems. It may enhance missile defence and joint military drills with the US and Japan to prepare for aerial threats.

Taiwan. Taiwan is the most directly threatened. Sixth-generation fighters could overwhelm Taiwan's defences, outmatch its current fleet, and enforce air superiority over the Taiwan Strait. Combined with unmanned systems and precision weapons, China could use these fighters in a potential blockade or invasion scenario. Taiwan must invest heavily in asymmetric defence strategies, such as anti-air systems, drones, and missile capabilities, to offset China's technological advantage. It will strengthen US-Taiwan collaboration, particularly for advanced defensive systems like the Patriot and Aegis missile systems.

India. While geographically distant from East Asia, India faces security challenges along its disputed borders with China. Chinese sixth-generation fighters could provide superior air power in a conflict scenario, outmatching India's existing fourth-generation aircraft, such as the Su-30 MKI or its limited fleet of Rafales. India's AMCA (Advanced Medium Combat Aircraft) project gains urgency to develop a fifth-generation platform and potentially leapfrog into sixth-gen technologies. It may need to strengthen partnerships and collaborations with Western nations, emphasising indigenous development and joint ventures.

China's sixth-generation fighter programme signifies a leap forward in its military modernisation. It presents a direct challenge to the regional balance of power, making it a pivotal development in shaping the strategic dynamics of the Indo-Pacific. The operationalisation of China's sixth-generation fighters could reorder regional air power dynamics, with the US and its allies responding with their advanced capabilities.

CONCLUSION

China's sixth-generation fighter aircraft programme is impressive, and as it inches closer to operational readiness, it signals a pivotal shift in global airpower dynamics. By leveraging advanced technologies like artificial intelligence, stealth, and hypersonic capabilities, China aims to achieve dominance in air combat and strategic deterrence. Compared to the United States and its contemporaries, Beijing's accelerated progress highlights its determination to close the technology gap. While equally ambitious, the US Next Generation Air Dominance (NGAD) programme emphasises joint combat capabilities and seamless integration within a broader technological ecosystem. Meanwhile, Europe's Tempest and FCAS programmes underscore the necessity for international collaboration but face delays and funding challenges.

The sixth-generation race is not merely about the aircraft but about the strategic ecosystems they represent. China's approach, marked by centralised control and rapid prototyping, offers speed but raises questions about operational reliability and sustainability. Notwithstanding, the implications of this development are profound. It mandates investments in asymmetric warfare and counter-stealth technologies for regional countries to mitigate a growing disparity. Globally, China's advancements could prompt a new arms race, influencing defence spending and alliances. SP

CHINA SURPRISED THE WORLD BY FLYING TWO 6TH GENERATION STEALTH AIRCRAFT IN DECEMBER 2024, SHOWCASING ITS RAPID ADVANCEMENTS IN AEROSPACE TECHNOLOGY. SHOWN HERE IS CHINA'S J-20, THEIR 5TH GENERATION AIRCRAFT.

CHINESE SIXTH GENERATION STEALTH FIGHTER: A MYTH OR REALITY

China's unveiling of the J-36 and J-50 simultaneously demonstrates its ability to rapidly develop and test advanced fighter platforms, signifying its intent to rival the United States in air power projection

By AIR MARSHAL R.G.K. KAPOOR (RETD)

CHINA SURPRISED THE WORLD BY FLYING TWO NEXT generation stealth aircraft on December 26, 2025 to mark 131st birthday of Mao Zedong. Historically, China has unveiled its technological achievements on important dates or events. These demonstration flights drowned an important event, flight trial of KJ-3000 AWACS aircraft, based on Y-20 platform. There was no official announcement however, the images couldn't have been released without the explicit approval of the Chinese government. Both these platforms are significantly different from the "White Emperor" unveiled as the sixth-generation platform by the Chinese during the Zhuhai air show. China's progress in fighter aircraft development has been extraordinary to say

PHOTOGRAPH: ENG.CHINAMIL.COM.CN / YANG JUN

the least. Flying so many different types of latest/next generation platforms speaks volumes of the research and development capability, so also the maturity in aerospace manufacturing.

Intense debate followed these demonstration flights. The analysts have christened them J-36 and J-50 based on the unconfirmed inputs originating from Chinese internet. China has signaled to the world that it is ready to compete with USA. No other nation, not even USA has displayed the capability or the capacity to unveil so many types in such a short time. The issue of whether they are truly sixth generation comes later. The fact is that these platforms are futuristic and will be refined to achieve specific characteristics to conform to a generational definition.

Each generation of fighter aircraft have been categorised by their characteristics and capabilities. This classification applies only to jet and not propeller powered aircraft. There are no watertight generational compartments or definitions.

First-generation were transonic jet engine, swept back platforms like the MiG-15 and F-86 Sabre. Second-generation fighters incorporated advancements in speed, weapons and sensors from their predecessors, these aircraft, F-104 Starfighter and MiG-21 had good radars, carried first air to air guided missiles and could fly at speeds of Mach 2.

Third-generation fighters had enhanced capabilities of radars with longer ranges and semi-active Beyond Visual Range (BVR) air to air missiles, radar warning receivers and chaff and flare dispensers like F-4 and MiG-23. Terms like datalinks, look down-shoot down, AESA radars, helmet mounted displays and cuing systems marked the fourth-generation of fighters. Multi role capability with stand-off weapons also came with the fourth-generation aircraft like F-15, F-16, Mirage-2000, MiG-29 and Su-27.

The term stealth was introduced with the fifth-generation platforms. Fifth-generation aircraft are characterised by their ability to fuse multiple onboard offensive and defensive sensors with off-board information to present smart, networked and accurate real time picture to the pilot. It combines low observable technologies to reduce visual, acoustic, IR, radar and electronic signatures of the aircraft. Distributed Aperture System (DAS) facilitates high situational awareness and reduces ambiguity, for faster and accurate decision making. The aircraft must also employ engines powerful enough for sustained supersonic flight without using afterburner, known as super cruise.

Basically, the aircraft must be capable of operating in contested environment by delaying or denying enemy systems to detect, track and engage the aircraft. While F-117 was the first stealth aircraft, F-22 is the first truly fifth generation fighter. Su-57, J-20 and F-35 also fall in this category but they do not necessarily have all the low observable features and super cruise capability.

CHARACTERISTICS OF SIXTH GENERATION AIRCRAFT

The sixth-generation aircraft is expected to be stealthier and tailless to perform air dominance and multi role/swing roles. The aircraft should operate efficiently across subsonic to supersonic regimes. It would be able to penetrate deep into enemy air space in highly contested environment. It would support high level of human-system integration with well laid out cockpit. It would have a system of systems approach, with network centric warfighting capability and sensors that see 360°. The aircraft will be powered by next generation adaptive propulsion engine to cater to high electrical and thermal demands and for operations across subsonic and high supersonic flight regimes.

The aircraft would have smart skins, be highly networked to support data to decision capability and support battlefield command, control and communications in real time using ground based, airborne and space-based sensors. It would be heavily software dependent with open architecture configuration for faster upgrades. It will be survivable, adaptable, persistent and interoperable in the air domain. It should be able to support Manned Unmanned Teaming also known as Collaborative Combat Aircraft (CCA). It will integrate AI, and carry weapons internally including Directed Energy Weapons (DEW) like high-power microwaves and lasers. The platform will carry embedded sensors and integrate AI for sensor fusion and decision support to the pilot including for guiding the CCA. It could use multiplexed fiber optics bus to provide jam resistance. The aircraft should be capable of cyber warfare and very high-altitude operations. The aircraft will have dark cockpit to reduce aircraft reflective signatures and fly at hypersonic speeds in its next stage of development.

SIXTH-GENERATION AIRCRAFT ARE EXPECTED TO BE STEALTHIER, TAILLESS, AND CAPABLE OF OPERATING EFFICIENTLY ACROSS SUBSONIC TO SUPERSONIC REGIMES WHILE INTEGRATING AI, DIRECTED ENERGY WEAPONS (DEW), AND ADVANCED NETWORKING CAPABILITIES

Many countries are currently pursuing the sixth-generation aircraft development. The efforts are led by USA and includes China, Russia and consortium of European nations. USA took the lead in developing the sixth-generation fighter in 2014 by announcing the Next Generation Air Dominance (NGAD) project. The first full scale flight demonstrator flew in 2020 and no details were made public.

PHOTOGRAPH: BAE SYSTEMS

CHINESE FIFTH GENERATION FIGHTERS

China inducted J-20 as its first fifth generation fighter in March 2017. It is a heavy air superiority fighter with high maneuverability, stealth characteristics, advanced sensors, AESA radar, integrated EW suite, internal weapon bay and good range. The design and features bear close resemblance to USAF F-22 and F-35. Some simulations in western world indicate that the J-20 has about four times median RCS than F-35 in X-band. The aircraft also has a relatively larger RCS in the VHF band. The aircraft is also heavier, it does not super cruise, the canards stymie stealth and engine exhausts do not make it low IR observable.

While, not much is known about what exists inside the aircraft in terms of sensor fusion and networking, it is believed that technologically the aircraft may not match the two USAF B-2 bomber. Recent assessment in USA indicates that the aircraft may become operational around 2030.

INDIA'S CURRENT DEPENDENCE ON IMPORTS FOR AERO ENGINES AND CRITICAL TECHNOLOGIES POSES A SIGNIFICANT CHALLENGE IN ACHIEVING FIFTH-GENERATION CAPABILITIES. SHOWN HERE IS INDIA'S PLANNED AMCA 5TH GENERATION AIRCRAFT.

fighters. So, J-20 in its present form falls short of being a true fifth generation fighter. However, the pace of technological advancements in China indicates that the aircraft is constantly evolving and maturing. The major impediment is the aero engine. This is where China finds its biggest challenge.

China unveiled J-35A stealth fighter during the recently concluded Zhuhai air show. The aircraft participated in the air display and drew a lot of appreciation. The aircraft closely resembles F-35, except that the J-35 is powered by two engines against one engine on F-35. It is believed that the lessons learnt during the development of J-20 and its operational exploitation have been incorporated in the J-35.

China is also developing its stealth bomber H-20 "Xi`an". This aircraft is likely to be a flying wing design incorporating latest stealth technologies, making it low observable, highly networked, with large internal weapons bay and long range to strike almost anywhere in the world. This project drew inspiration from USAF

CHINESE SIXTH GENERATION COMBAT AIRCRAFT

China officially unveiled its sixth-generation aircraft the "White Emperor" (Baidi) during the Zhuhai airshow in November 2024. The full scale mock up seems to incorporate most of the characteristics desired of a sixth-generation aircraft with a sleek design and improved stealth in the RF, IR and acoustics. China claims that the aircraft will be capable of flying at high supersonic speeds in near earth's atmosphere as an integrated space-air fighter.

The first flight demonstration on December 26, 2024 took place from Chengdu Aircraft Corporation (CAC). This aircraft has been christened the J-36. It is bigger than a conventional fighter and smaller than a bomber with likely two- seater design, either side by side or tandem. Its unique diamond shaped double delta wing and tailless design indicate advanced stealth. Its length is about 22 metres and wing span around 20 metres. The aircraft with its size will carry large weapon loads over long ranges. The aircraft is configured with three engines. Two engines are configured classically with caret intakes below the wings and the third engine on top of the fuselage has a Diverterless Supersonic Inlet (DSI) intake. The aircraft feature 2D nozzles a departure from the arched nozzles seen in the exhaust of Chinese fifth-generation fighters. The aircraft features trailing edge control surfaces, including split flap-rudder for manoeuvring the aircraft.

Another feature of this aircraft is its double wheel undercarriage bogies, traditionally, single wheel configurations sustain all up weight of around 35 tonnes. Twin wheel configuration and the size of the aircraft indicate an all up weight in the region of 50 tonnes, closer to a fighter-bomber class. The aircraft is optimised for high speed, BVR air dominance and deep penetration strike role, coupled with command post role of controlling many unmanned systems and manned fifth generation fighters.

While outer dimensions and characteristics are easy to analyse, the real capability exists inside the aircraft. It is not known whether the engines are WS-10C or WS-15, it is also not known whether all three engines are the same or the third engine is different. However, three engines would cater to the thrust and high electrical load requirements along with cooling requirements for thermal loads generated by onboard systems. Very importantly, DEW weapons would consume a lot of electrical power. Another view point is that the available Chinese engine technology does not fulfill power to weight requirement of this platform, which led to integration of the third engine. It is believed that more information on Sensor fusion, Electronic Warfare (EW), aircraft performance, weapon load out, networking and MUM-T will be known in the years ahead. What is however, clear is that this is not an agile platform to undertake dog fights.

The second aircraft flown on the same day was probably from the Shenyang Aircraft Corporation (SAC). The aircraft is smaller than the J-36. The Shenyang J-50 aircraft has a sharply swept wing, closely resembling a "Lambda Wing" profile with

PHOTOGRAPH: SP GUIDE PUBNS

foldable vertical stabilisers for enhanced performance. The aircraft is 22 metres long, with all up weight in the region of 40 tonnes and a max speed around Mach 2.0. It is a tailless design with enhanced stealth features, powered by two engines matching its smaller size. The engine intakes are Diverterless Supersonic Inlet (DSI) intakes positioned on either side of the fuselage. The aircraft has conventional single wheel undercarriage. It is not clear whether the aircraft has a cockpit, so it could either be a manned or unmanned platform. Analysts point out that the aircraft can carry four PL-17 BVRAAMs. It can carry one YJ-12 Anti-ship missile with a range of 400 kms. The aerodynamic design stymies stability and maneuverability, which could be mitigated with two-dimensional thrust vectoring.

Appearance of J-36 and J-50 from two different developers simultaneously could mean that the two aircraft are prototypes and are competing for the next generation fighter programme of the PLAAF. However, going by the past experience it is quite possible that both platforms would continue to develop and the one that matures first would be inducted into PLAAF, while the other could potentially be exported in consonance with the Chinese geo-strategic objectives.

China has, in a month displayed a full-scale mock-up of sixth-generation "White Emperor" and flew two latest generation fighters. It has also flown its latest KJ-3000 AWACS based on the Y-20 platform with AESA radar. Combined capability of KJ-3000, integrated with J-36, J-20, J-35 and H-6 enables PLAAF enviable long-range Offensive and Defensive Counter Air capability. This represents a major achievement for the aerospace industry. Whether these aircraft are actually sixth generation platforms (a definition which is itself little hazy) or will be clear in due course. The demonstration flights are a proof that China has bridged the technological gap to a large extent. It also goes to show that China has started understanding importance of aerospace power and is investing heavily in it. These aircraft also demonstrate China's own idea of future combat air power and design. China is known to be a leader in AI and Quantum computing which will drive faster development of next generation platforms. For the first time in the history of military aviation, China is leading.

Pentagon in its 24th China military power report revealed that China is undertaking most dramatic military buildup since World War II. President Xi Jinping and his party are addressing issues with determination and PLAAF is now training under more realistic conditions. The PLAAF goal is "to serve as a comprehensive strategic air force capable of long-range airpower projection." The latest developments are aligned to realise this objective.

There is a debate whether these are truly sixth generation platforms. Assessment of J-20 and J-35 provide valuable insights into the technological capability of China. If the US assessment that H-20 will be ready in 2030 is true than China is yet to master some critical technologies required for a sixth-generation fighter aircraft. So, in their present form both the aircraft may meet only some characteristics of sixth generation. China has however, shown to the world that it is capable of flying a latest generation design.

> The Pentagon's 24th China military power report highlights that China is undergoing the most dramatic military buildup since World War II, with the PLAAF aiming to become a comprehensive strategic air force capable of long-range power projection

IMPLICATIONS FOR INDIA

These platforms have severe ramifications for India. IAF is currently a fourth generation Air Force with a high percentage of upgraded legacy platforms. The indigenous developmental and production process is now gaining momentum. While sufficient maturity has been achieved in aircraft design, structures and some sensors, the country is completely dependent on imports for aero engines and some critical technologies. Integrating software dependent diverse system is always a challenge.

China, has sufficient industrial capacity to rapidly manufacture large number of these platforms. A combination of J-20/ J-35/ J-36/ J-50 supported by enablers, KJ-3000 and Y-20U will pose a serious threat to the IAF. The disadvantages of terrain would not be an impediment for the PLAAF under the new paradigm. It is therefore, important to work single mindedly on achieving fifth-generation capability in a shorter timeframe than presently envisaged. The window available to India has actually shrunk to six years or so.

A probable air scenario could be ground-based radars and KJ-3000 AWACS flying at above 30,000 ft feeding fused air situation picture to J-36 carrying six PL-17 and eight PL-15 BVRAAMs, or a combination of Air-to-Air and Air-to-Ground weapons. J-36 is controlling H-6 bomber with long range air to ground cruise missiles, UAVs armed with Air to Ground weapons and J-20/ J-35 armed with PL-15s. The pilot flies the J-36, the weapons systems operator designates targets for the team members, and simultaneously uses inputs from KJ-3000 to launch its PL-17 at long ranges against hostile AWACS/ Air to Air refuelers and fighters while flying at altitudes of 60,000 to 70,000 ft without using its own radar. This is a plausible and challenging scenario for any modern Air Force.

CONCLUSION

J-36, J-50 and KJ-3000 reflect maturing of Chinese aerospace R&D and industry and a deliberate attempt to demonstrate this capability to the world. While there may be many questions on whether these are actually sixth generation or not, the fact remains that China has been able to bridge the gap that existed with respect to USA in aerospace design, engineering and technology. The only question that remains is whether the Chinese can effectively and efficiently employ these platforms in a highly contested and networked air space where decision making is delegated. These developments have serious consequences for India and IAF. This variety of stealth platforms will allow China to undertake rapid build-up and exercise air dominance both from within as well outside its own airspace. This calls for a prompt response from Indian government and aerospace industry. Leapfrogging technologies is inescapable in face of such challenges. SP

SEVERAL EUROPEAN AND ASIAN COUNTRIES HAVE SELECTED THE C-390 MILLENNIUM MULTI-MISSION AIRCRAFT TO MODERNISE THEIR OPERATIONAL CAPABILITIES

EMBRAER DEFENSE & SECURITY — AN EVOLVING GLOBAL LEADER

Embraer Defense and Security's portfolio exemplifies innovation and versatility, delivering advanced solutions across air, land, sea, space, and cyber domains to meet the evolving demands of global defence

By **AYUSHEE CHAUDHARY**

PHOTOGRAPHS: EMBRAER

SINCE ITS INCEPTION IN 1969, EMBRAER HAS TRANSFORMED into a global powerhouse in aerospace, earning accolades for its innovation, performance, and strategic vision. While its commercial aviation segment is widely recognised, Embraer Defense & Security has emerged as a vital arm, contributing significantly to global defence and security markets. This segment has positioned itself as a leading innovator, offering an array of cutting-edge solutions, including military aircraft, surveillance systems, and integrated defence platforms, earning the trust of over 60 nations worldwide.

THE FOUNDATION

Headquartered in São José dos Campos, Brazil, Embraer Defense & Security serves as a linchpin in Brazil's national defence strategy. The company's origins are rooted in advancing Brazil's self-reliance in aerospace technology. Over time, Embraer has leveraged its deep technical expertise to deliver versatile and cost-effective defence solutions that cater to both developing and developed nations. The company's core philosophy revolves around adaptability, cost-efficiency, and user-centric design, making its products highly appealing to a diverse range of customers.

TECHNOLOGICAL INNOVATIONS AND INTEGRATED SOLUTIONS

Beyond aircraft, Embraer Defense & Security delivers integrated solutions tailored to modern security challenges. Through its subsidiary Savis, the company designs advanced border surveillance and monitoring systems, fortifying national security for customers in regions like Latin America and Africa. Additionally, Embraer's partnerships with Atech, a leading developer of command and control systems, and Visiona, which specialises in satellite integration, demonstrate its commitment to a holistic approach to defence. These collaborations ensure Embraer remains at the cutting edge of technological advancements, offering clients unmatched interoperability across platforms.

GLOBAL COLLABORATION AND STRATEGIC PARTNERSHIPS

A key driver of Embraer's success is its robust network of partnerships. Collaborations with defence organisations like Saab (on Brazil's Gripen fighter jet programme), Lockheed Martin, and Boeing highlight the company's ability to align with global giants. Embraer's deep integration into NATO standards and partnerships with nations outside the Western bloc underscore its agility in navigating a multipolar defence market.

(TOP) SWEDEN SELECTS THE EMBRAER C-390 MILLENNIUM AS ITS NEW MILITARY TRANSPORT AIRCRAFT; (ABOVE) SLOVAKIA INDICATES THE EMBRAER C-390 MILLENNIUM AS THE BEST OPTION FOR ITS FUTURE MILITARY TRANSPORT AIRCRAFT.

COMMITMENT TO SUSTAINABILITY AND INNOVATION

Embraer D&S's evolving trajectory in defence aligns with its broader corporate commitment to sustainability and innovation. The company actively explores the use of sustainable aviation fuels (SAF), electrification, and enhanced materials to reduce the environmental footprint of its products. The C-390 Millennium, for instance, offers reduced lifecycle costs and fuel efficiency, aligning operational capability with environmental responsibility.

EMBRAER PORTFOLIO: COMPREHENSIVE SOLUTIONS ACROSS DEFENSE AND SECURITY DOMAINS

Embraer Defense and Security offers an extensive and versatile portfolio that addresses all facets of defence and security operations. Leveraging cutting-edge technology, the company provides advanced solutions across Air, Land, Sea, Space, and Cyber domains, enabling robust operational capabilities for defence forces worldwide.

- In the **Air** domain, Embraer is a global leader, providing a diverse range of defence and Security aircraft, including the multi-mission C-390 Millennium and the light attack A-29 Super Tucano. The portfolio also features the P600 AEW&C surveillance aircraft, platforms for Medevac, training, and flight inspection, aircraft modernisation programmes, and air traffic management systems.
- For **Land**, Embraer delivers radar and land systems that protect critical assets with layered surveillance solutions, command and control centers, and modular systems integration tailored to customer needs.
- In the **Sea** domain, Embraer, through its subsidiary Atech, offers integrated maritime solutions for tactical missions, combining vessel systems, sensors, and aircraft to enhance situational awareness and decision-making while ensuring cybersecurity.

(TOP AND ABOVE) EMBRAER'S A-29 SUPER TUCANO IS DESIGNED TO OPERATE IN CHALLENGING ENVIRONMENTS, INCLUDING UNPAVED RUNWAYS AND RUGGED TERRAIN. RECENTLY EMBRAER SOLD FOUR A-29 SUPER TUCANO AIRCRAFT TO A NEW CUSTOMER IN AFRICA.

- Through its subsidiary Visiona Space Technology, Embraer operates in Space, offering satellite development, remote sensing, telecommunications, and advanced SAR aerial survey technologies.
- In **Cyber**, Tempest Security Intelligence, a subsidiary of Embraer, specialises in digital security with over 20 years of expertise. Tempest provides strategic consulting, managed security services, software integration, and digital identity solutions, securing critical infrastructure against evolving cyber threats.

GAME-CHANGING AIRCRAFT PLATFORMS

At the heart of Embraer Defense & Security portfolio is its flagship product, the C-390 Millennium. This next-generation multi-mission military transport aircraft exemplifies the company's ethos of innovation and operational flexibility. Capable of rapid troop and cargo transport, medical evacuations, and air-to-air refueling, the C-390 is redefining air mobility. Praised for its unmatched reliability, reduced operational costs, and versatility, the aircraft has been adopted by Brazil, NATO (North Atlantic Treaty Organisation) member nations and Asian countries, signaling Embraer's growing influence in global defence.

Another standout is the A-29 Super Tucano, a turboprop light-attack aircraft that balances rugged performance with modern capabilities. With over 260 units delivered to clients such as the United States, Afghanistan, and several African nations, the Super Tucano has proven effective in counter-insurgency missions, training, and surveillance operations. Its ability to operate in austere environments, combined with advanced avionics and cost-effectiveness, makes it a staple for nations seeking reliable solutions in asymmetric warfare.

EMBRAER'S YEAR-END HIGH WITH THE C-390 MILLENNIUM AND A-29 SUPER TUCANO

Embraer concluded 2024 with significant milestones, affirming its position as a leading force in the global defence aviation market. Its flagship military platforms—the C-390 Millennium and the A-29 Super Tucano—are redefining the standards for versatility, performance, and cost-effectiveness. With new contracts and expanded adoption across continents, including Europe, South America, Africa, and Asia, Embraer is meeting the dynamic requirements of modern defence forces.

Embraer's latest customer for C-390 Millennium is the tenth nation to select the C-390 after Brazil, Portugal, Hungary, South Korea, the Netherlands, Austria, the Czech Republic, Sweden and Slovakia.

The A-29 Super Tucano is the global leader in its category, in operation by 16 air forces.

THE C-390 MILLENNIUM: REVOLUTIONISING MULTI-MISSION AIRLIFT

Adoption Across Europe and NATO

The C-390 Millennium continues its ascent as the aircraft of choice among EU/NATO (North Atlantic Treaty Organisation) members and its allies in Europe, contributing to the modernisation of their armed forces while adding new capabilities and enhancing interoperability with allied forces. Portugal, Hungary, and Brazil currently operate the platform, with additional orders from the Netherlands, Austria, and the Czech Republic. Sweden recently selected the aircraft, citing its ability to enhance operational capabilities while ensuring interoperability with allied forces. Slovakia is poised to join the programme, as the Slovak Ministry of defence has announced plans to purchase three C-390 units in early 2025. This decision is influenced by the operational synergies the aircraft offers with neighboring countries already using the platform. During this visit to Brazil, the Slovak Minister of defence acknowledged that the Embraer C-390 is the option that better fits Slovakia's future military transport requirements.

The Slovak Ministry of defence's interest underscores the C-390's role as a unifying platform among allied forces. Slovakia

EMBRAER'S A-29 SUPER TUCANO LIGHT ATTACK AIRCRAFT THAT HAS BEEN USED IN MANY COUNTRIES, INCLUDING ASIA, AFRICA AND SOUTH AMERICA

has emphasised the benefits of shared logistics, training, and operational synergies with neighboring nations operating the C-390, positioning the aircraft as a critical asset for fostering regional collaboration.

Exceptional Performance and Versatility

Since its operational debut with the Brazilian Air Force (FAB) in 2019, the C-390 has proven itself as a leader in its category. By 2024, the fleet has logged over 15,500 flight hours, achieving a mission capability rate of 93 per cent and mission completion rates exceeding 99 per cent. Its ability to handle diverse missions—from troop and cargo transport to firefighting, medical evacuation, disaster relief, and air-to-air refueling—sets it apart in the medium military transport segment. Notably, the aircraft's payload capacity of 26 tonnes, speed of 470 knots, and compatibility with temporary or unpaved runways make it an indispensable asset for modern air forces. Since it was founded in 1969, Embraer has delivered more than 9,000 aircraft. On average, about every 10 seconds an aircraft manufactured by Embraer takes off somewhere in the world, transporting over 150 million passengers a year.

Expanding Capabilities

Embraer and FAB are actively enhancing the C-390's utility through ongoing collaboration. Embraer and the FAB signed an agreement today at Mostra BID, the National defence and Security Fair in Brasilia, to deepen collaborative studies aimed at expanding the capabilities of the C-390 Millennium platform for Intelligence, Surveillance and Reconnaissance (ISR) missions, with a focus on Maritime Patrol. A new Modular Airborne Fire Fighting System (MAFFS II) was also integrated into the fleet, enabling rapid deployment of up to 12,000 liters of water in just seven seconds—further broadening the aircraft's humanitarian mission profile.

Global Expansion and Reliability

The C-390's growing global footprint now includes Brazil, Portugal, Hungary, Sweden, South Korea, Austria, the Czech Republic, and the Netherlands. Most recently, Embraer signed a contract with an undisclosed customer for two additional C-390 units configured for missions such as tactical transport, humanitarian aid, disaster response, and medical evacuation. These additions make the customer the tenth nation to select the platform, reinforcing its reputation as the next generation of military airlift.

In 2023, SAMI, Saudi Arabia's defense and security leader, and Embraer signed an MoU to enhance cooperation in aerospace, focusing on promoting the C-390 Millennium aircraft and supporting the Kingdom's Ministry of Defense. The agreement included plans to establish maintenance capabilities, explore a Regional MRO Hub and final assembly line, integrate mission systems, and collaborate on training to expand opportunities in Saudi Arabia's aerospace sector.

The development of new operational capabilities demonstrates Embraer's engineering and systems integration expertise. The aircraft is already considered by its end users as the most advanced in its category.

A-29 SUPER TUCANO: SETTING NEW STANDARDS IN LIGHT ATTACK AND ADVANCED TRAINING

Expanding Global Adoption

The A-29 Super Tucano's global presence continues to grow, with over 290 orders and 5,70,000 flight hours, including 60,000 in combat operations. Recent contracts highlight its widespread appeal, including sales to the Portuguese Air Force (A-29N), and orders from the Uruguayan and Paraguayan Air Forces. In Africa, Embraer signed a deal for four units with an undisclosed customer for border surveillance, counterinsurgency, and ISR missions. Another undisclosed buyer placed an order for six units, scheduled for delivery in 2026, equipped for battlefield air interdiction, maritime patrol, and territorial defence.

EMBRAER AND THE BRAZILIAN AIR FORCE (FAB) HAVE SIGNED AN AGREEMENT TO EXPAND THE CAPABILITIES OF THE C-390 MILLENNIUM FOR ISR MISSIONS, WITH A FOCUS ON MARITIME PATROL

Unmatched Operational Flexibility

The A-29's multi-mission capabilities cover a wide range of roles, such as armed reconnaissance, air escort, advanced pilot training, maritime strike, and border surveillance. Its robust airframe is designed for austere environments, capable of operating from unpaved runways without infrastructure. This operational reliability is paired with reduced maintenance requirements, making it an economical choice for air forces worldwide. For air forces seeking a proven, comprehensive, efficient, reliable, and cost-effective solution on a single platform, coupled with great operational flexibility, the A-29 Super Tucano offers a wide range of missions such as close air support, air patrol, special operations, air interdiction, JTAC, forward air controller (FAC), air and tactical coordinator (TAC), armed ISR, border surveillance, reconnaissance, air escort, basic, operational and advanced training, transition to air superiority fighters, JTAC/LIFT and FAC training.

Portugal as the Launch Customer for the A-29N

Portugal's Ministry of National defence became the launch customer for the new variant of this advanced trainer and light attack aircraft, A-29N Super Tucano, procuring 12 units tailored to meet NATO standards. Equipped with advanced avionics, NATO-specific communication systems, and undisclosed operational enhancements, this variant offers unmatched versatility for Advanced Pilot Training, Light Attack, Close Air Support (CAS), and ISR missions. Portugal's acquisition signals a commitment to modernising its Air Force with a proven, cost-effective, and reliable aircraft. With this purchase, Portugal became the first nation to operate the A-29N, leading the way in adopting a very capable platform designed to support a wide range of modern defence missions.

Market Leadership

As the global leader in its category, the A-29 Super Tucano combines cutting-edge technology with operational practicality. Its advanced human-machine interface avionics, precise targeting systems, and comprehensive communications suite ensure mission success across diverse operational contexts. Whether for counterinsurgency or training for next-generation air superiority fighters, the A-29 offers unparalleled value to its operators.

EMBRAER'S LEGACY AND GLOBAL REACH

Since its inception, Embraer has delivered more than 9,000 aircraft. With one taking off every 10 seconds somewhere in the world, the company transports over 150 million passengers annually. As Brazil's largest exporter of high-value goods, Embraer is a pioneer in commercial jets with up to 150 seats and a key player in global defence innovation.

Through cutting-edge platforms like the C-390 Millennium and A-29N Super Tucano, Embraer continues to transform defence aviation, driving collaboration, enhancing capabilities, and securing its position as a trusted partner for nations worldwide.

With a vision rooted in continuous innovation and customer-driven solutions, Embraer Defense & Security is poised to expand its footprint further. Its commitment to cost-effective, adaptable, and technologically advanced solutions has positioned it as a critical partner for nations aiming to modernise their defence capabilities. As global security challenges evolve, Embraer's agility and ingenuity ensure it will remain at the forefront of aerospace and defence, shaping the future of military aviation and integrated security systems. Embraer's Defense and Security portfolio exemplifies innovation, adaptability, and a commitment to enhancing global security. By integrating advanced technologies across Air, Land, Sea, Space, and Cyber domains, the company continues to empower armed forces and security agencies to meet the challenges of today and tomorrow. SP

(ABOVE) DEFENCE MINISTER RAJNATH SINGH INAUGURATE THE CONFERENCE WITH THE VICE CHIEFS, DRDO'S CHAIRMAN, DEFENCE SECRETARY (DP) AND DIRECTOR, DRDO TDF;

(LEFT) AIR MARSHAL TEJINDER SINGH, DEPUTY CHIEF OF THE AIR STAFF. HE EMPHASIZED ON THE URGENT NEED TO MAKE OUR OWN ENGINE.

"WE SHOULD PUT ALL OUR EFFORTS INTO BEING SELF-RELIANT ON AN AERO-ENGINE" — AIR MARSHAL TEJINDER SINGH, DCAS

The quest for an indigenous aero-engine remains a challenge despite the initial success of the Kaveri engine. Can it be a national mission? What is needed to achieve a higher thrust of engine for Tejas Mk2 and AMCA? The possibilities are discussed at the TDF DRDO Conference among the leaders and outstanding aerospace scientists at the Conference.

By MANISH KUMAR JHA

NEW WARFARE TECHNOLOGIES HAVE INTRODUCED AN element of urgency to observe and act on a new approach to the capability development roadmap. That is about the national thrust on R&D in military technologies. The military needs to sharpen its readiness in advanced technology, emerging technology, nuclear, cyber, space, and artificial intelligence. Defence Minister Rajnath Singh has called upon the private sector to move forward from 'participation' to 'taking the lead' in the defence sector, assuring the Government's full support to make India an innovation & technology hub and one of the strongest countries

PHOTOGRAPHS: MANISH KUMAR JHA, PIB

(LEFT TO RIGHT) MANISH KUMAR JHA, CONSULTING EDITOR IN CONVERSATION WITH AIR MARSHAL TEJINDER SINGH, DCAS; DR K. RAJALAKSHMI MENON (CHAIR), DS & DG AERO, IAF; NEELESH TUNGAR, PRESIDENT, BHARAT FORGE & CEO, KALYANI STRATEGIC SYSTEMS; SHANKARAIH MADA, ASSOCIATE DIRECTOR, ADA; JYOTI GODA, MD, TEJASE AEROSENSE

in the world. He was addressing scientists, industry leaders, academia, startups, MSMEs and young entrepreneurs during Twaral, a DRDO-Industry Workshop on Defence Technology Acceleration organised at DRDO Bhawan in New Delhi.

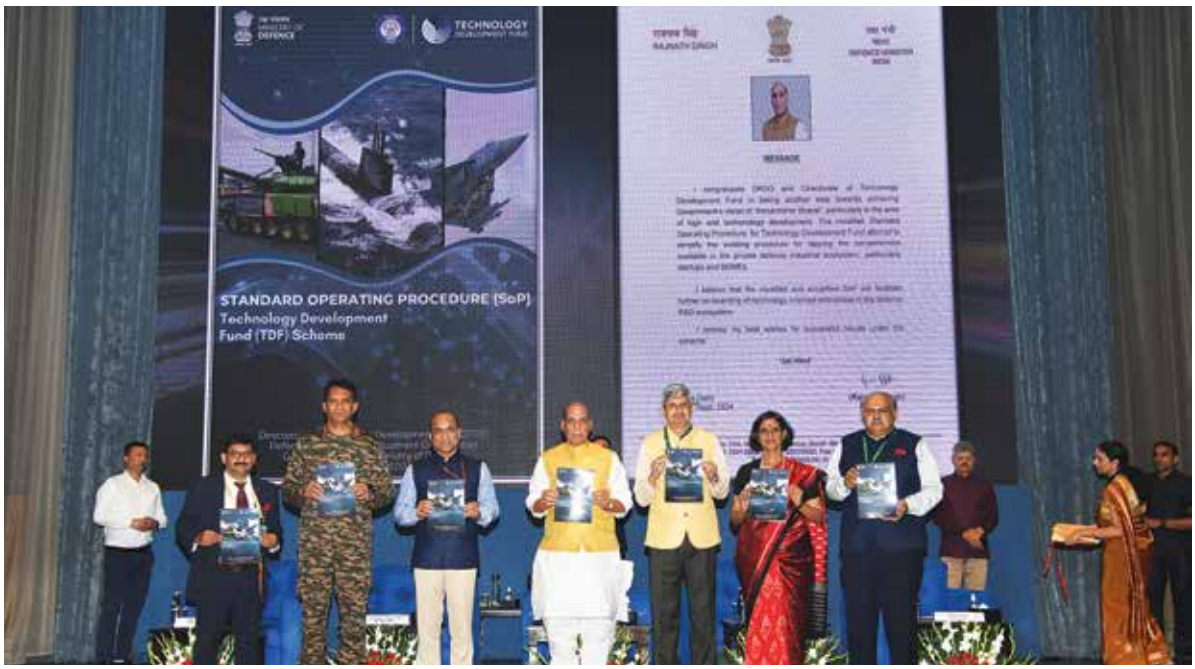
The session begins with Manish Kumar Jha, Defence Editor, on "Self-Reliance in Defence Technology and Manufacturing through Innovation, and R&D involving all stakeholders" with distinguished and eminent panellists like Air Marshal Tejinder Singh, DCAS, Indian Air Force, Rear Admiral Sanjay Adhana, ACOM (MoD), Neelesh Tungar, President, Bharat Forge & CEO, Kalyani Strategic Systems, Shankaraih Mada, Associate Director, ADA (Aeronautical Development Agency) and Jyoti Goda, Managing Director, Tejase Aerosense.

In response to the question of "What is needed for self-reliance in manufacturing advanced technology in India: design and development?", M.Z. Siddique, Former DS, and Director General (Aero) and Distinguished Scientist said, "If you truly look at the statistics in terms of the kind of R&D spend as a country today, what we are doing, is about 0.65 per cent of the gross domestic product. You talk in terms of the gross domestic expenditure on R&D. The number is quite low and the ranking is quite low as you compare with other countries, South Korea for example, is close to about 4.67 per cent which is the highest to spend in terms of R&D as a percentage of the gross domestic product. So, we need to truly build in that kind of an ecosystem, having the funds, doing meaningful R&D. Cutting Edge R&D is going to be a distant dream."

Then, what is the outlook for Indian defence OEMs, and what is needed to break boundaries in building new tech involving all stakeholders? How can ecosystems be developed to achieve our goal in 2047? Siddique raised another crucial point to have a very clear definition, as to what we are trying to do and whether we have defined self-reliance currently. "Are we talking about self-reliance and self-sufficiency, or are we talking about sovereignty? These are certain questions we need to address to ourselves, do some soul-searching and answer them. So, the point is to identify those Technologies which will give us that kind of a leadership position," Siddique said.

> **Air Marshal Tejinder Singh stressed the urgent need for self-reliance in aero-engine development, calling it a "watershed moment" for India's defence industry, as dependency on foreign engines continues to hinder progress**

Replying to what is the status of Tejas Mk1A, engine challenges (GE 404) in terms of production and delivery, Deputy Chief of the Air Staff Air Marshal Tejinder Singh put forth his perspectives, "Defence goods are competitive goods. It is not enough for them to work correctly. They have to work better than what your adversity has got. So, in that case, we need to be expeditious in technology development." He further elaborated, "I just came to Bangalore where I had the opportunity to visit various entities. I spend a lot of time with Hindustan Aeronautics Limited (HAL), DRDO, the Aeronautical Development Agency (ADA), and the Centre for Airborne Systems (CABS). I think one gets a very good feeling and we are very proud of the work that is



DEFENCE MINISTER RAJNATH SINGH RELEASING TECHNOLOGY DEVELOPMENT FUND (TDF) SOP WITH THE LEADERS FROM DRDO, THE MILITARY AND DEFENCE MINISTRY

being done in terms of getting cutting-edge Technologies. DG (Aero) is doing some phenomenal work in indigenising a lot of competencies which will reduce our dependence. But when it comes to Tejas, the General Electric 404 engine, we must not forget our history. We had developed the HF-24 Marut aircraft. It was a success for HAL."

"But again, the stumbling block was the aero-engine. Because we were dependent on them. Last month, we had to sign a contract for 240 engines for the Su-30 MKI. I think the watershed moment of our defence industry would be If we could make our engine," he spoke. DCAS finally added, "I think this unique capability will keep coming in the way of our progress. We have done very well in integrating, in upgrading, in fact, in Indian Air Force we feel very proud that we have upgraded all our platforms."

On the airborne systems especially radar, DCAS praised the work by DRDO and said, "Extraordinary good work, which has been done by CABS in integrating the airborne systems the NETRA radar, and much more capability exists. We are already ready, but the stumbling block once again, comes with having a wide-body aircraft or a large aircraft for this part." "So, I feel, this problem of Tejas is a matter of contract and it will get resolved. But again, it highlights the shortcoming of not having the capability to make your engine," he sums up.

So, what are the futuristic technologies in aerospace that IAF is looking out for and how indigenous are those say AMCA, radars? DCAS points out that that thrust on aero-engine should be our top priority. "We should put all our efforts into being self-reliant on an aero-engine. If we can do that, thereafter with that capacity and technologies, we can overcome a lot of work. I think you'll be able to make an aircraft. We'll be able to make the control systems. We make all the accessories which are required, we'll be able to integrate the weapons. All those technologies we have either mastered or we have the capacities within us," he emphasised.

The IAF is also gearing up for space warfare. And then what is needed to boost up capabilities in this evolving multi-domain? The deliberation on this centred around the integrated air defence systems and what is the futuristic roadmap in terms of advanced weapons? Additionally, how can we design & develop & manufacture emerging tech/systems like Hale/ Male drones, and aero-engine in India under "Make in India"?

Manish Jha raised pertinent questions as after the milestone of Tejas Mk1, India has greater ambitions from Tejas 2 to AMCA. How ADA is incorporating critical design, stealth, and autonomous elements in our quest for 5th or 5+generation fighter jets? What about the budgetary constraint and timeline? Shankaraih Mada, a leading aerospace scientist at Aeronautical Development Agency (ADA), pointed out the elements of upgraded Tejas, and clarified, "MK1A is the derivative of MK1 except for a few changes. The additional sensors are coming. So as DCAS is saying, more worries are the numbers to produce and the maintainability. So, we are working towards better maintainability and product support."

"So, we are working with HAL closely and we are supporting each other. So, the numbers, of course, come with the production facility. What is available there? But there are certain build issues which arise and also are required to be worked upon. We are closely associated and then we are putting our best efforts into that," he adds.

The quest for an indigenous aero-engine remains a challenge despite the initial success of the Kaveri engine. Can it be a national mission? What is needed to achieve a higher thrust of 110KN engine? How far have we succeeded in addressing the core tech, materials, and testing capabilities? Worldwide there is the trend for global collaboration to achieve advancements in terms of aerospace technology. How ADA is looking at such collaborations? We need to have a collaborative research code, design code, development, joining plans together with the foreign engine house with a strict know-how and know why coming into the country IP residing inside the country. That is the crux and path for self-reliance in advanced tech. SP

THE MINISTRY OF DEFENCE HAS SET UP A HIGH-LEVEL COMMITTEE TO ASSESS THE IAF'S CURRENT CAPABILITIES AND EXPEDITE THE ACQUISITION OF NEW AIRCRAFT WHILE BOOSTING INDIGENOUS PRODUCTION

BRIDGING THE GAP IN THE SKIES

Ministry of Defence sets up a committee to address gaps within the Indian Air Force with a focus on Fighter Jet Squadrons & UCAVs

By MANISH KUMAR JHA

PHOTOGRAPH: DRDO_INDIA / X

THE INDIAN AIR FORCE (IAF) IS CURRENTLY GRAPPLING WITH significant challenges concerning its fighter jet squadrons, leading the Ministry of Defence (MoD) to set up a high-level committee to address the crisis. The IAF, which plays a pivotal role in safeguarding India's airspace and military interests, faces a shortage of fighter jets and an increasing need to modernise its fleet. With a rapidly changing security environment, the situation has reached a critical point, and the MoD's intervention underscores the urgency of the matter.

THE COUNTER-ATTACK CAPABILITY

How do the forces measure their capability? The very question of capability is based on the ability to not only counter the adversaries' capabilities but also be able to launch an

THE INDIAN AIR FORCE IS GRAPPLING WITH A CRITICAL SHORTFALL, OPERATING WITH FEWER THAN 30 FIGHTER SQUADRONS AGAINST AN OPTIMAL REQUIREMENT OF 42, PRIMARILY DUE TO AN AGEING FLEET AND DELAYED INDUCTIONS

offensive thereafter. While it pertains to all services, the IAF has geared up to address its gaps which is certainly a step in the right direction.

A look at China's growing defence exports to Pakistan and Bangladesh reflects its increasing influence in South Asia. While IAF does boost India's superior and advanced air-defence systems like the S-400 and a good combination of Su-30 MKI and Rafale among others, the Pakistan Air Force (PAF)'s purchase order of 40 J-35 jets from China, is adding equal firepower which designed for both air superiority and strike missions. China has also forayed into next-generation air defence systems as per from the variety of combat jets and UAVs/UCVs. Recently, China's Aerospace Science and Technology Corporation launched the FK-4000 mobile air defence weapons system which uses high-power microwaves (HPM) to intercept the smallest, lightest drones down to micro unmanned aerial aircraft.

At the same time, the rapid development in warfare puts the air force at the core of the technological landscape with autonomous weapons and laser/energy dimensions taking shape clearly. On top of that space warfare adds to the air force as the most potent frontier force today.

And so, China's push for the development of AI-enabled technologies for autonomous vehicles, predictive maintenance and logistics, automated target recognition and other military tools.

Parallelly, Pakistan has fully leveraged China's willingness to support them with arms despite the economic crisis. Notably, China aided the Pakistani air force with ranges such as the Burraq, Shahpar series, and Chinese-manufactured CH-4B and Wing Loong I and II among others.

With multiple opinions on China's aggressive arms export support to Pakistan and now Bangladesh, the situation demands serious strategic deliberations and actions which IAF has rightly called out for.

THE CRISIS WITHIN THE IAF

The IAF has long been struggling with issues related to the number and quality of its fighter jet squadrons. According to defence analysts, the optimal strength for the Indian Air Force is around 42 squadrons, but currently, it is hovering around 30 or fewer. This deficit is largely due to an ageing fleet, the variants of the MiG-21, the MiG-23 and the MiG-27 aircraft, the delayed induction of new aircraft, and the limited production capacity of indigenous fighter jets. The IAF's outdated fleet, particularly the Mirage 2000s and MiG-21s, poses serious concerns for both national security and operational readiness.

A report from the Parliamentary Standing Committee on Demands for Grants of the Ministry of Defence for the year 2024-25 outlines the conservative timeline for the futuristic Advanced Medium AMCA's delivery in the next decade. Additionally, the progress of LCA MK2 which is built over the existing platform of Tejas Mk1A, is slow as the delivery of the engines from GE Aerospace further adds to the problem. This indeed leads to the dependency on the legacy combat aircraft in the arsenal of IAF which include Mirage 2000, MiG-29, and Jaguar jets.

The geopolitical climate in the region has exacerbated the situation, with rising tensions along India's borders with both China and Pakistan. The need for a robust, modern air force capable of quick, strategic deployment has never been more critical. However, the IAF is not only facing the challenge of replacing older aircraft but also integrating new platforms and technologies to maintain air superiority.

THE FIGHTER JET SQUADRON DILEMMA

A key issue in the IAF's current crisis is the depletion of fighter jet squadrons. A squadron typically comprises around 16–18 aircraft, but due to attrition, operational requirements, and maintenance delays, many of the existing squadrons are understrength or unable to meet the IAF's strategic needs.

PHOTOGRAPH: WIKIPEDIA / FLYINGDAGGERS45SQUADRON

PROCUREMENT OF CUTTING-EDGE TECHNOLOGIES FROM FOREIGN OEMS, ESPECIALLY FORCE MULTIPLIERS LIKE UCAVS, CAN FILL THE GAPS CREATED BY CHALLENGES IN PROCUREMENTS

Furthermore, the delay in acquiring advanced fighter jets has further compounded the issue.

The indigenously developed Light Combat Aircraft (LCA) Tejas has been lauded as a potential solution with the purchase order 83 LCA Mk-1A but its production has been slow. IAF has received and operationalised two squadrons of Tejas Mk1A (aircraft). The aircraft's numbers are not yet sufficient to fill the gap created by the shortage of frontline jets until the purchase order of another 97 LCA Mk-1A aircraft fully materialises in terms of delivery for which AoN was accorded and RFP was issued.

Additionally, India's heavy reliance on foreign suppliers for critical components and advanced technologies has caused delays in aircraft production, further exacerbating the crisis. The situation is a reminder of the IAF's long-standing challenge: balancing modern procurement while ensuring the timely decommissioning and replacement of ageing platforms.

MOD'S INTERVENTION: SETTING UP A COMMITTEE

In response to this growing crisis, the MoD has constituted a high-level committee to conduct a comprehensive review of the IAF's current capabilities and future requirements. This committee will assess the IAF's long-term fighter jet needs, focusing on the acquisition of new aircraft, the strengthening of indigenous production, and streamlining the operational readiness of existing squadrons.

The committee's mandate includes:

- **Reviewing the Current Fleet Status:** Evaluating the operational strength of existing squadrons and identifying the gaps in air defence capabilities.
- **Expediting Aircraft Procurement:** Addressing the delays in the procurement process and pushing forward the acquisition of new aircraft to meet the IAF's strategic needs.
- **Strengthening Indigenous Production:** Providing recommendations on ramping up domestic production of aircraft, such as the Tejas, and ensuring that defence PSUs (Public Sector Undertakings) can deliver on time.
- **Improving Maintenance and Operational Efficiency:** Addressing the logistical and maintenance challenges faced by squadrons, which often result in a shortage of ready-to-fly aircraft.
- **Strategic and Operational Planning:** Ensuring that the IAF's squadrons are optimally positioned to respond to any regional or global security threat.

The committee is expected to submit its findings and recommendations within a set timeframe, after which a clear roadmap will be developed to strengthen the IAF's fighter jet fleet. The MoD's active role in resolving this crisis reflects the government's awareness of the critical importance of the air force in modern warfare.

THE WAY FORWARD: A NEED FOR URGENT ACTION

The crisis within the IAF highlights the pressing need for a comprehensive strategy to modernise and expand the fleet, especially given the challenges posed by neighbouring countries. The MoD's committee must work in close collaboration with the IAF to ensure that the force remains at the cutting edge of airpower technology and operational readiness.

Furthermore, as India moves toward becoming a regional military power, the government will need to adopt to approach defence procurement which includes balancing the need for high-tech foreign aircraft with a robust domestic defence industry capable of meeting future requirements.

While the IAF faces significant challenges, the establishment of a MoD committee is a critical step in addressing the fighter jet squadron crisis. With concerted efforts, investment in indigenous technology, and strategic acquisitions, the IAF can emerge stronger, ensuring that India remains secure in an increasingly complex and volatile world. SP

PHOTOGRAPH: GA-ASI

THE BOEING C-17 IS CONSIDERED THE WORLD'S BEST STRATEGIC AIRLIFT AIRCRAFT AND MARKED A STEP CHANGE IN THE CAPABILITY OF THE IAF'S TRANSPORT FLEET BECAUSE OF ITS HUGE PAYLOAD CAPACITY

TRANSFORMATION OF THE TRANSPORT FLEET

The IAF probably sees the MTA project as a welcome opportunity to bridge the huge emerging gap between the payload capacity of the Airbus C295 and that of the Boeing C-17 and enhance its overall airlift potential

By JOSEPH NORONHA

THE TRANSPORT FLEET OF THE INDIAN AIR FORCE (IAF) MAY appear to lack some of the glamour of the fighter fleet. But it is an equally essential arm in war, and perhaps even more useful in peace time. IAF aircraft like the giant Boeing C-17 Globemaster III and the Ilyushin Il-76MD in the strategic lift category, as well as the Lockheed Martin C-130J-30 Super Hercules in the medium lift category, are invaluable for the rapid movement of personnel, weapons, equipment and supplies across vast distances in the country and beyond. In the light lift category, there is the twin-turboprop Antonov An-32RE – a long-time stalwart. And from September 2023 onwards, the Airbus C295MW joins the fleet. It will be a welcome addition to the IAF's inventory for more reasons than one.

While the IAF's transport fleet routinely conducts air maintenance operations along the country's borders, and in other areas, it is also frequently used for Humanitarian Assistance and Disaster Relief (HADR) missions. So what does the IAF currently have in its 250-strong inventory of transport aircraft, and what does the future hold?

COUNTING ON THE C-295

In September 2021, the Indian government signed a ₹21,935 crore deal with Airbus Defence and Space to procure 56 C295MW aircraft for the IAF under the Atmanirbhar Bharat Abhiyan (self-reliant India campaign). The aircraft will replace the IAF's vintage 5.1-tonne payload capacity HS 748M Avro

PHOTOGRAPH: IAF_MCC / X

IAF VALUES C-130J'S CAPABILITY AND PERFORMANCE, PARTICULARLY ITS ABILITY TO OPERATE FROM SEMI-PREPARED, SHORT AND UNLIT AIRSTRIPS IN DARKNESS – FEATURES THAT ARE VITAL FOR A SWIFT RESPONSE

twin turboprops, manufactured by Hindustan Aeronautics Limited (HAL). The first 16 C295 flyaway aircraft will be supplied between September 2023 and August 2025 from the Airbus facility in Seville, Spain. These are expected to equip the IAF's 12 Squadron AF based at AF Station Vadodara. The remaining 40 C295 aircraft will be manufactured by Tata Advanced Systems Ltd (TASL), in partnership with Airbus, between September 2026 and August 2031. On completion of the project the IAF will be the world's largest C295 operator by far.

The C295 will be the first military aircraft to be privately manufactured in India. In October 2022, Prime Minister Narendra Modi laid the foundation stone of the manufacturing facility being jointly established by TASL and Airbus at Vadodara. The assembly line which is similar to the one in Seville, will be operational by November 2024. During the assembly, major components including the nose, fuselage, wings and tail unit will be integrated and tested. The parts that go into building the plane will be transported from Tata's C295 main constituent assembly plant at Hyderabad which has already started making them, indicating the sense of purpose with which the Airbus-Tata consortium is approaching its task.

All 56 aircraft for the IAF will be fitted with an indigenous electronic warfare suite developed by Bharat Electronics Ltd and Bharat Dynamics Ltd. Following the delivery of these aircraft, Airbus can sell the C295 to other customers within India and export it to countries cleared by New Delhi. The Indian Navy and Indian Coast Guard have already expressed interest in acquiring at least nine and six aircraft respectively, configured for the maritime surveillance role. The Border Security Force is another keen contender, and the IAF could well buy some more planes. A passenger version might also appeal to India's rapidly growing airline industry.

IAF TRANSPORT FLEET AT A GLANCE

	STRENGTH	CATEGORY	PAYLOAD (KG)	POWERPLANT
Boeing C-17 Globemaster III	12	Strategic Lift	74,800	4 x turbofans
Ilyushin Il-76	17	Strategic Lift	43,000	4 x turbofans
Lockheed Martin C-130J-30 Super Hercules	12	Medium Lift/ Special Ops	19,950	4 x turboprops
Antonov An-32RE	104	Light Lift	7,500	2 x turboprops
HAL HS-748M Avro	54	Light Lift	5,100	2 x turboprops
Airbus C295 (under induction)	56	Light/Medium Lift	9,000	2 x turboprops
Dornier Do 228	50	Utility	19 passengers	2 x turboprops

(Data compiled)

PHOTOGRAPH: LOCKHEED MARTIN

According to Airbus, the C295 aircraft can carry up to nine tonnes of payload or as many as 71 troops or 50 paratroopers at a maximum cruise speed of 260 knots. Powered by two Pratt & Whitney PW127G turboprop engines it has excellent short take-off and landing (STOL) performance from unpaved, soft, and sandy/grass airstrips. It also has outstanding low-level flight characteristics for tactical missions, flying at speeds as low as 120 knots.

Among its many roles, the C295 can airdrop paratroopers and loads, and undertake Casualty Evacuation (CASEVAC) or Medical Evacuation (Medevac). It is also capable of Special Missions as well as HADR and maritime patrol duties, where its 2,000 nautical mile range would be an asset. According to India's Ministry of Defence (MoD), "The aircraft (C295) will give a major boost to the tactical airlift capability of the IAF, especially in the northern and northeastern sectors and the Andaman and Nicobar Islands." While the first batch of IAF pilots and technicians have already been trained at Seville, the remaining pilots and technicians are due to be trained during 2024.

C-130J – THOROUGHBRED TRANSPORT

The IAF's involvement with the C-130J Super Hercules began in 2008 with the signing of a $1.06 billion deal for six aircraft. They were the C-130J-30 variant, customised for Special Operations for which the IAF did not have a dedicated platform earlier. They equip 77 Squadron AF, based at Air Force Station Hindan. The IAF signed another deal worth $1.01 billion for six Super Hercules aircraft in December 2013. These aircraft equip 87 Squadron AF at Air Force Station Arjan Singh, Panagarh. Panagarh is also the headquarters of the Indian Army's 17 Mountain Strike Corps, dedicated to offensive operations against China in the eastern sector.

The C-130J is a workhorse in operation around the globe, around the clock. It has 18 different mission variants, making it the leading name in military transport aircraft. According to Lockheed Martin, "The C-130 has the longest, continuous military aircraft production run in history and one of the top three longest, continuous aircraft production lines of any type."

The C-130J is powered by four Rolls-Royce AE 2100D3 turboprop engines. The engines have full-authority digital electronic control (FADEC) and an automatic thrust control system (ATCS) that optimally balances the power of the four engines, thus allowing lower minimum speeds for superior short-field performance. The avionics include four L-3 systems with multifunction liquid crystal displays (LCD) for flight control and navigation, which means reduced crew requirements.

Payload capacity wise, the C-130J-30 can carry eight 463L pallets, 97 litters, 128 equipped combat troops or 92 paratroopers, totalling 19,950 kg. However, the IAF prefers to use it for its primary role – Special Operations – and not fritter it away for routine transport tasks. It has a cruise speed of 365 knots and a max payload range of 3,300 km without inflight refuelling.

The C-130J's ability to undertake precision low-level flying and aerial delivery by night – thanks to its advanced navigational aids and equipment – also make it a prized asset. The IAF values its capability and performance, particularly its ability to operate from semi-prepared, short and unlit airstrips in darkness – features that are vital for a swift response to an emerging security or terrorist threat. It fully exploits the plane's wide mission flexibility and ability to speedily access some of the remotest regions of the country. The C-130J has proved invaluable during natural calamities and is the platform of choice for tackling emergent contingencies.

The IAF has also set at least one of the claimed 54 World Aviation Records of the C-130J when on August 20, 2013, an IAF Super Hercules landed at the world's highest Daulat Beg Oldie airfield near the Line of Actual Control (LAC). The 16,614 feet high airstrip in Ladakh had been activated specially to take the plane.

THE C295 WILL BE THE FIRST MILITARY AIRCRAFT TO BE PRIVATELY MANUFACTURED IN INDIA

C-17 – HEAVY LIFT CHAMPION

In 2012, the Indian government signed a $4.1 billion deal for the purchase of 10 Boeing C-17 strategic airlift aircraft through the US government's foreign military sales (FMS) programme. One more C-17 was acquired later. This marked a step change in the capability of the IAF's transport fleet because the C-17's 74.8-tonne payload capacity was a huge increase over the 43-tonne limit of the Il-76. It has since proved its worth in exercises as well as in HADR missions. The 12 C-17s equip 81 Squadron AF based at Air Force Station Hindan.

The Boeing C-17 is almost 30 years old but it is still considered the world's best strategic airlift aircraft. Despite its size, a fully-loaded C-17 can take off from a 7,000-foot runway and land on a small, austere airstrip of just 3,000 feet length and 90 feet width. This superlative performance is thanks to its four Pratt & Whitney F127-PW-100 engines, each rated at 40,440 pounds thrust, coupled with an externally blown flap system that allows a steep, low-speed final approach and low landing speeds. With a cruise speed of 450 knots at 28,000 feet, the C-17 can fly 2,400 nautical miles without inflight refuelling.

PHOTOGRAPH: AIRBUS

MAKING THE MOST OF THE MTA

The experience gained from the C295 induction, including its strong 'Make in India' focus and dedicated manufacturing line in India, should prove invaluable when it comes to replacing the IAF's 104-strong An-32 fleet. Although the fleet was upgraded in the past decade under a $400-million deal signed with Ukraine in 2009, the IAF may have only 80 to 90 operational aircraft now. And these are due to be phased out from 2032 onwards. However, the war in Ukraine means the hard-hit Antonov (OEM of the An-32) may not be capable of sustaining the fleet, perhaps hastening its retirement.

The IAF initiated the process of finding a replacement for the An-32 with a Request for Information (RFI) in December 2022 for the procurement of a Medium Transport Aircraft (MTA) with a payload capacity of 18 to 30 tonnes. This capacity indicates that the IAF sees the project not as purely for An-32 replacement (for which the Airbus C295 might have been a good option) but also to augment its total airlift capability. The extended bid submission date was March 31, 2023. Vendors were asked to provide a 'Rough Order of Magnitude (ROM) cost of aircraft and associated equipment' for batches of 40, 60, and 80 aircraft.

THE OPERATIONAL FLEXIBILITY OF THE NEXTGEN EMBRAER C-390 MILLENNIUM MAKES IT AN IDEAL CHOICE FOR A VARIETY OF MISSIONS

Three different manufacturers responded: Lockheed Martin with its C-130J Super Hercules, Airbus offering the A400 Atlas, and Embraer proposing the C-390 Millennium. The A400 with its 37-tonne payload capacity might seem oversized. But it would give the Indian military the capability to rapidly transport armoured vehicles – such as tanks weighing up to 25 tonnes – to the Ladakh region in the event of another face-off with China. A major advantage of the C-130J is that it is already in service with the IAF and hence has a functional operations and maintenance setup with trained aircrew and technicians. But it may prove unsuitable to airlift tanks.

As of now, the Embraer C-390 appears to be the strongest contender. With its 26-tonne payload capacity it is the only one that falls squarely within the MTA stipulation of 18 to 30 tonnes. It is also a much newer design, and a jet aircraft with greater speed and operational efficiency than the other two turboprop powered types. The C-390 is the heaviest and most complex plane Embraer has constructed to date and, since the company has expressed keenness for production in India, would eminently fit this country's 'Make in India' aspirations. Earlier this year, Embraer Defense & Security and the Mahindra Group inked a MoU aimed at jointly acquiring the C-390 Millennium multi-mission aircraft for the Indian Air Force's (IAF) medium transport aircraft (MTA) procurement project. The collaboration between Embraer and Mahindra signifies a concerted effort to harness the unmatched mobility, high productivity, and operational flexibility of the C-390 Millennium, all at a low operating cost, making it an ideal choice for a myriad of missions.

Leveraging Embraer's expertise and Mahindra's local knowledge, they will collaborate with the IAF and the indigenous aerospace industry to devise an industrialisation plan tailored to India's unique requirements. Embraer is actively pursuing avenues for technology transfer in India, engaging with both private enterprises and the IAF to customise their offerings. With the IAF's demand for MTA, Embraer is keen on establishing an assembly line for the C-390 Millennium within India. The long-term vision includes forging strategic alliances and establishing assembly lines and MRO facilities, solidifying India's position as a regional hub for the C-390 aircraft.

Powered by a pair of IAE V2500-E5 turbofan engines mounted forward on its high wing, Embraer C-390 can be configured to perform various conventional operations such as troop, VIP and cargo transportation, and more specialised logistical operations such as in-flight refuelling and seems to be just what the doctor ordered for the IAF.

EYE ON THE FUTURE

The IAF's transport fleet is currently quite capable. However, the replacements due in the next 10-15 years need to be addressed soon.

The IAF is reportedly carrying out a comprehensive study to identify the current and future payload-carrying requirements of the fleet. This is all to the good because the IAF's regional role is expanding, and a sizeable fleet of medium/strategic airlifters is needed to meet its goal of transformation into a strategic force. In addition, there are frequent demands for HADR missions within and outside India. When the Il-76MD is withdrawn from service around 2035 the IAF's strategic lift capability will depend entirely on the C-17 of which it has only 12 aircraft. There are no in-production aircraft in the Il-76 payload class except the Il-76 itself and it would be highly inadvisable to purchase a 1970s design in the 2030s. Therefore the IAF probably sees the MTA project as a welcome opportunity to bridge the huge emerging gap between the payload capacity of the Airbus C295 and that of the Boeing C-17 and enhance its overall airlift potential. It would be advisable to make an expeditious choice, with a future focus, and sign the MTA contract soon. SP

PHOTOGRAPH: EMBRAER

GAIL HALVORSEN (1920-2022)

"Operation Little Vittles" lasted from September 22, 1948, to May 13, 1949, airdropping over 23 tonnes of candy for the children of Berlin using over 2,50,000 makeshift parachutes

GAIL HALVORSEN WAS A SENIOR OFFICER IN THE UNITED States Air Force (USAF). Despite belonging to a force better known for raining death and destruction from the skies, he had the intriguing sobriquet of the "Berlin Candy Bomber" and "The Chocolate Flier". It was all because he ventured to air-drop candy for German children.

Gail Seymour Halvorsen was born in Salt Lake City, Utah, on October 10, 1920. He gained his private pilot's licence in 1941 and joined the United States Army Air Forces (USAAF) in 1942. Although he was keen to be a fighter pilot, the USAAF was in urgent need of transport pilots. In July 1948, Halvorsen was assigned as a Douglas C-47 Skytrain pilot for the Berlin Airlift that had commenced just a month earlier. The Airlift was mounted to ferry supplies into the starving city of Berlin, which the Soviet Union had blockaded. Officially known as "Operation Vittles", it finally became the largest humanitarian airlift operation in history. It proved that an airlift could be used to sustain a large population surrounded by hostile forces.

Halvorsen was an avid photographer and on his days off regularly went sightseeing in Berlin to shoot films. One day, as he was taking pictures of American planes taking off and landing at Tempelhof, the main landing site for the airlift, he noticed a group of about thirty children gathered behind the barbed-wire fence that protected the base. When he went over to meet them, they said that if he could not land due to bad weather, not to worry. They could survive on a little food, but if they lost their freedom, they might never get it back. All over the world, children would beg candy from the Americans. But these children, who were obviously hungry, asked for nothing. Touched, Halvorsen took out two sticks of gum – his personal rations – and handed them over. The children immediately broke the bars into little pieces and shared them out. He promised them (somewhat rashly) that the following day when he would be flying above them he would drop candy out of his aircraft. An excited child asked "How will we know it is your plane?" He replied that he would wiggle his wings. This later earned him another nickname: "Uncle Wiggly Wings".

That night, Halvorsen, his co-pilot, and his engineer gathered their rations for the next day. Keen to ensure that no child was injured by the falling package, Halvorsen made three parachutes out of handkerchiefs and tied the boxes of candy to them. Besides the regular supply drops, they also dropped three boxes. The waiting children were ecstatic. And their numbers outside the Tempelhof airport fence grew significantly week by week. The children also sent many letters of appreciation and gratitude to Halvorsen. Naturally the action was totally against official regulations, but Halvorsen was determined. Eventually the matter reached the ears of Major General William Tunner, commander of the Berlin Airlift. General Tunner was impressed by the positives vibes Lieutenant Halvorsen's efforts were generating for the United States. And he encouraged the candy drops to continue.

In September 1948, Halvorsen was sent back to the United States to publicise "Operation Little Vittles" as it was now called. After he appeared on the CBS-TV programme "We the People", candy manufacturers began donating sweets, and schoolchildren volunteered to wrap them in simulated parachutes made from handkerchiefs and twine. Adults conveyed the parcels to where they could be swiftly transported to Germany. Later, college student Mary Connors of Massachusetts took charge of the now expanding national project, working with the National Confectioner's Association to prepare the candy and tie the handkerchiefs.

At least two dozen pilots from Lieutenant Halvorsen's squadron were among those who took part in the gum drops. They became known as "Candy Bombers". "Operation Little Vittles" lasted from September 22, 1948, to May 13, 1949, air-dropping over 23 tonnes of candy for the children of Berlin using over 2,50,000 makeshift parachutes.

In later years, Halvorsen conducted or advocated candy drops in Bosnia-Herzegovina, Albania, Japan, Guam, and Iraq. He also helped to develop reusable manned spacecraft for the United States. Halvorsen retired from the USAF in August 1974, after 31 years of military service, having accumulated over 8,000 flying hours. He died from respiratory failure on February 16, 2022, at the age of 101.

In one of his many interviews, Gail Halvorsen remarked, "One of my fellow Airlift pilots had bombed Berlin during the war. I asked him how he felt about flying day and night on behalf of the enemy, the very ones who did their best to kill him as he flew over Berlin in 1944. He hesitated a moment, shuffling his feet and then said, 'It feels a lot better to feed them than it does to kill 'em.'" SP

— JOSEPH NORONHA

APPOINTMENTS

AIR MARSHAL JEETENDRA MISHRA ASSUMES COMMAND OF IAF'S WESTERN AIR COMMAND

Air Marshal Jeetendra Mishra assumed command of the Indian Air Force's Western Air Command on January 1, 2025. The Air Marshal was commissioned into the Indian Air Force as a fighter pilot on December 6, 1986. A Fighter Combat Leader and an experimental Test Pilot, Air Marshal Mishra has more than 3000 hours of flying experience.

In his service career spanning over 38 years, the Air Marshal has tenanted important command and staff appointments. These include Commanding Officer of a Fighter Squadron, Chief Test Pilot at Aircraft & Systems Testing Establishment (ASTE), Air Officer Commanding of two frontline air bases, Director (Operational Planning and Assessment Group), Principal Director (ASR) and Asst Chief of Air Staff (Projects) at Air HQ (VB), Commandant ASTE and Deputy Chief of Integrated Defence Staff (Doctrine, Organisation and Training). He was Deputy Chief of Integrated Defence Staff (Operations) prior to taking over his present appointment.

AIR VICE MARSHAL MANMEET SINGH TOOK OVER AS SENIOR OFFICER-IN-CHARGE ADMINISTRATION, HEADQUARTERS WESTERN AIR COMMAND, INDIAN AIR FORCE

On January 1, 2025, Air Vice Marshal Manmeet Singh took over as Senior Officer-in-Charge Administration, Headquarters Western Air Command, New Delhi. Air Vice Marshal Manmeet Singh was commissioned in the Administration Branch of Indian Air Force on June 13, 1992. During his illustrious service career, he has tenanted key appointments in various operational Units, Command Headquarters and at Air Headquarters.

BOEING APPOINTS DEASY AS CHIEF INFORMATION OFFICER

Boeing announced Dana Deasy as the company's new Chief Information Digital Officer and Senior Vice President, Information Technology & Data Analytics. Elected to the role effective December 31, 2024, Deasy will oversee all aspects of information technology, information security, and data and analytics. He will report to Boeing President and CEO Kelly Ortberg and serve on the company's Executive Council.

Deasy brings to Boeing more than 40 years of technology and leadership experience and a career that has spanned multiple industries. Most recently, he served as Chief Information Officer at the US Department of Defense.

DUNCAN AVIATION ANNOUNCES SENIOR LEADERSHIP CHANGES

Effective January 1, 2025 Jeff Lake, who was previously CEO and President, transferred the President title to Mike Minchow, formerly Chief Operating Officer of the company's Lincoln, Nebraska, MRO facility. Kasey Harwick, former Vice President of Quality-Lincoln, was promoted to Executive Vice President and Chief Operating Officer of the Lincoln facility.

Minchow is a 31-year team member with Duncan Aviation, joining the Duncan Aviation Design Center in 1993 and was named Chief Operating Officer-Lincoln in July 2020.

Harwick joined Duncan Aviation's Lincoln location in 1999. He was promoted to Vice President of Maintenance and in 2019 he returned to Lincoln as Vice President of Aircraft Services and Quality.

DR JOHANNES BUSSMANN TO BECOME NEW CEO OF MTU AERO ENGINES AG

Dr Johannes Bussmann (55) is to become the new CEO of MTU Aero Engines AG. This was unanimously decided by the supervisory board of the DAX-listed company at an extraordinary meeting. The contract term will be for five years.

Johannes Bussmann is expected to take up his new role in the course of 2025. He is currently CEO of TÜV Süd AG. Prior to that, the aerospace engineer, who holds a doctorate in aerospace engineering, spent seven years leading maintenance, repair and overhaul specialist Lufthansa Technik. He has been a member of the MTU Supervisory Board since 2024.

DEUTSCHE AIRCRAFT APPOINTS NICO NEUMANN AS CO-CEO

Deutsche Aircraft, a leading regional aircraft manufacturer, has announced the appointment of Nico Neumann as Co-CEO alongside current CEO, Dave Jackson. Nico Neumann will assume the role of Co-CEO from January 1, 2025 and will relinquish his current position of Chief Operating Officer. Neumann will guide Deutsche Aircraft through its next phase, delivering the D328eco® aircraft to market by 2027. This role is part of a managed transition, with Neumann set to assume full CEO responsibilities for the Deutsche Aircraft-operated businesses in Munich and Leipzig by mid-2025.

MILITARY

CAC COMMANDERS' CONFERENCE

Air Chief Marshal A.P. Singh, Chief of the Air Staff, Indian Air Force visited Headquarters Central Air Command (CAC) from December 18 to 19, 2024 for the CAC Commanders' Conference 2024. During the conference, the CAS interacted with the Commanders of the CAC AoR and highlighted the importance of being conversant with one's role in enhancing the operational capability of the Indian Air Force. He apprised them about prevailing security scenario, significant role of the Indian Air Force and stressed on the need for maintaining a high state of readiness and alertness to take on emerging contingencies. He emphasised the need for critical analysis to enhance operational preparedness, focus on maintenance practices and ensure robust physical and cyber security. He urged the Commanders to continue their efforts in ensuring a safe operational flying environment and stressed on the need to augment the combat capability of the IAF through innovation and self-reliance.

COMMANDERS' CONFERENCE-2024 WESTERN AIR COMMAND

A two day Commanders' Conference of Western Air Command (WAC) of the Indian Air Force was held on December 6 & 7, 2024 at New Delhi, with Air Chief Marshal A.P. Singh, Chief of the Air Staff (CAS) as the Chief Guest. During the conference, the CAS interacted with the Commanders of the WAC AoR, and discussed the need to pursue training for ensuring the capability to fight and win multi-domain warfare. He emphasised on the theme for this year "Bharatiya Vayu Sena - Sashakt, Saksham, Atmanirbhar", and sought the collective capability, capacity and commitment of all commanders to take the IAF to even greater achievements. He emphasised on the need to achieve focused progress in various areas, which include increasing operational capability through better training and planning; early operationalisation of newly inducted equipment; safety and security, and nurturing leaders by empowering individuals at all levels to turn into a future ready and cohesive force.

US ARMY ORDERS ADDITIONAL BOEING CH-47F BLOCK II CHINOOKS

The US Army ordered three additional CH-47F Block II Chinooks from Boeing The Lot 3 contract award, valued at $135 million, is a part of the U.S. Army's ongoing modernisation efforts. This contract award follows the US Army's February announcement that it is moving forward with full-rate production of the CH-47F Block II programme. To date, Boeing is under contract for nine of up to 465 aircraft in the Army's current fleet. Boeing delivered the first production CH-47F Block II aircraft to the Army in June followed by the second in September.

POLAND TO ACQUIRE THREE MQ-9B SKYGUARDIANS

General Atomics Aeronautical Systems, Inc. (GA-ASI) announces the sale of three MQ-9B SkyGuardian Remotely Piloted Aircraft (RPA) systems to the Polish Ministry of Defence. The MQ-9B is the newest model of RPA produced by GA-ASI, and will serve as the foundational intelligence, surveillance, and reconnaissance (ISR) platform for Poland. The sale to Poland also includes two Certifiable Ground Control Stations (CGCS) and three years of GA-ASI's SkyGuardian Global Support Solutions.

CIVIL

PEGASUS AIRLINES ORDERS UP TO 200 BOEING 737-10 AIRPLANES

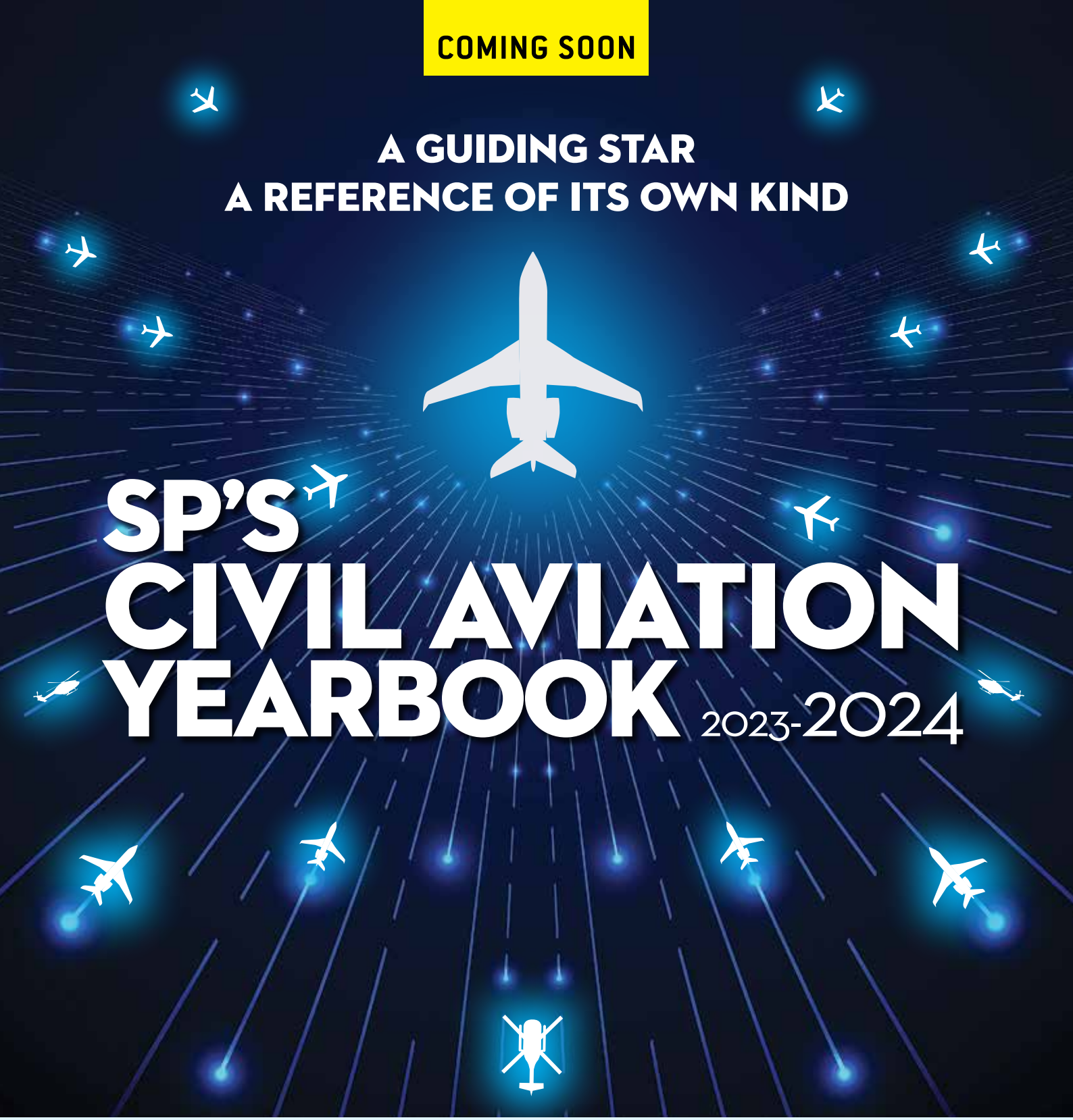
Boeing and Pegasus Airlines announced Türkiye's leading low-cost carrier will grow and modernize its single-aisle fleet with an order for up to 200 737 MAX airplanes. The airline's purchase includes a firm order for 100 737-10 jets – plus options for 100 more. The airplane's efficiency and flexibility will enable Pegasus Airlines to serve more passengers on more routes with the lowest cost per seat of any single-aisle airplane. Pegasus Airlines launched operations with the Boeing 737 Classic nearly 35 years ago. The 737-10 will complement the airline's fleet of Next-Generation 737s by providing operational commonality and flexibility to meet growing travel demand.

EASYJET TRIALS NEW PAINT THAT LOWERS THE WEIGHT AND FUEL BURN

easyJet has become the first airline in the world to trial a new state-of-the-art lower-weight paint, which will enable the operator to make further savings on fuel. easyJet and its partner Mankiewicz Aviation Coatings have developed a new system that reduces the amount of paint previously needed to create the iconic easyJet livery colours. The innovative solution has already been applied to 38 aircraft and will be rolled out gradually to easyJet's entire fleet, with the airline due to complete the transition by 2030.

The 38 easyJet planes that have been coated with the new paint are already delivering fuel savings thanks to their lighter weight and once rolled out to the entire fleet will account for a 1,296 tonne fuel reduction – equivalent to 4,095* tonne reduction of carbon emissions.

Eventually, and complementary to easyJet's sustainability strategy and roadmap to net zero, the lightweight paint is expected to contribute to an overall saving of 1296 tonnes of fuel per year – once the roll out is completed at the end of 2029. ●



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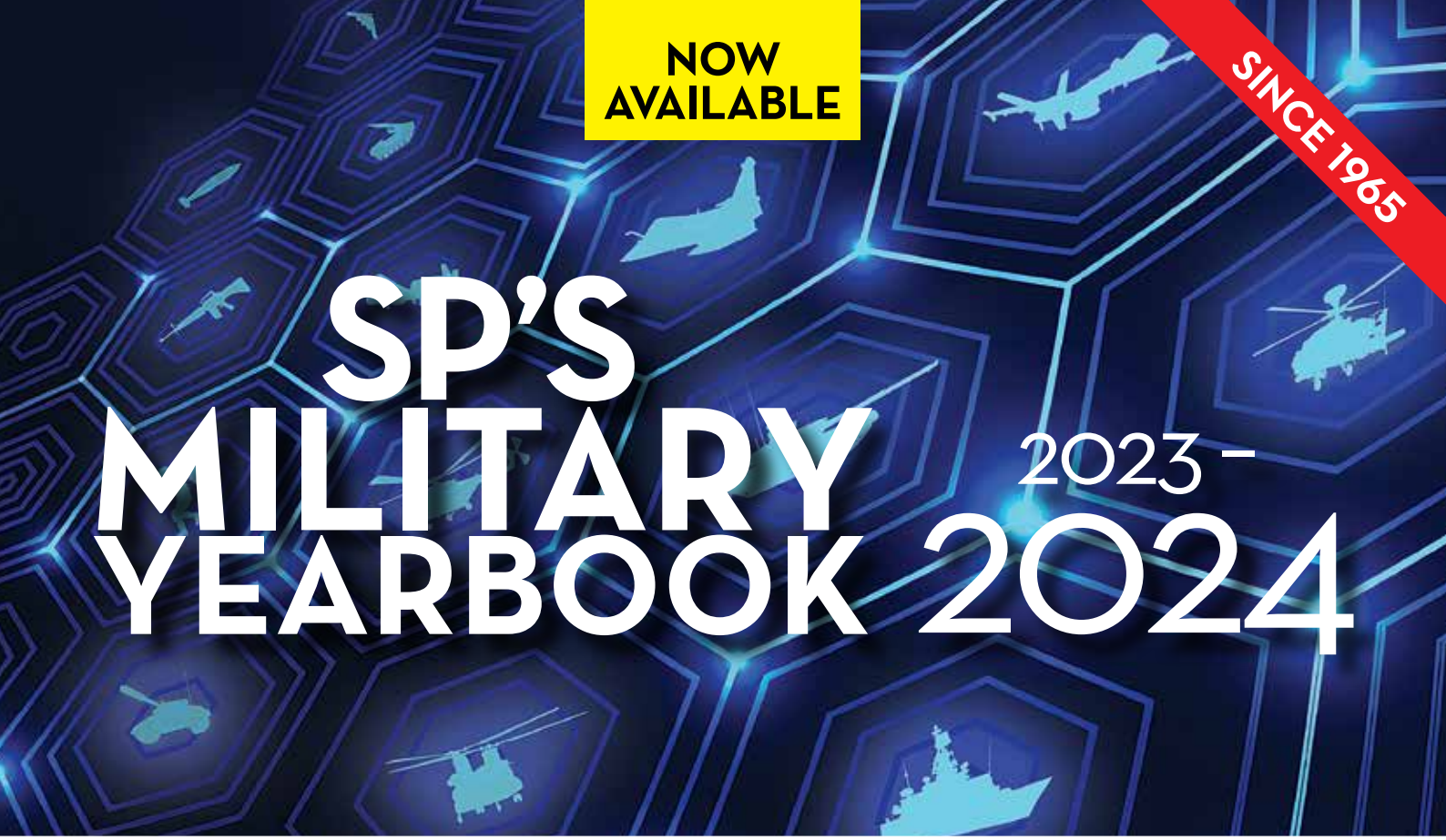

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