ISSN 2230-9225

SP's aviation

AN SP GUIDE PUBLI

SHARP CONTENT JDIENCE

www.sps-aviation.com

VOL 28 ISSUE 2 • 2025

₹100.00 (INDIA-BASED BUYER ONLY)

AERO INDIA 2025 SPECIAL

MEET US AT Hall-K
STALL NO. : KS3.2

EXCLUSIVE

SANJEEV KUMAR, SECRETARY, DEPARTMENT OF DEFENCE PRODUCTION

PAGE 12

MUCH MORE...

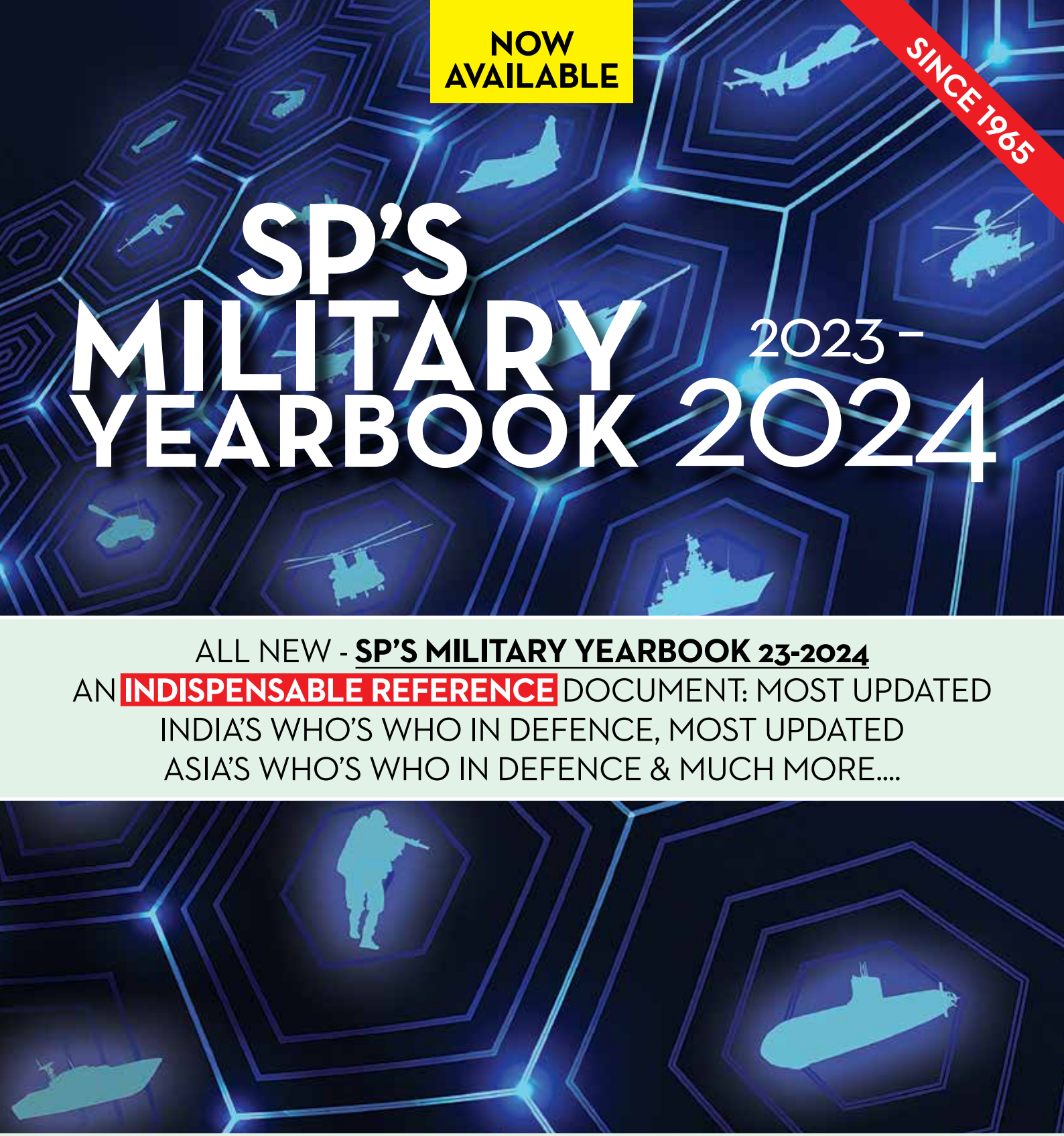
EXCLUSIVE

"INDIAN AIR FORCE'S INVOLVEMENT IN TESTING, TRIALS & EVALUATION PROCESSES, AMPLY DEMONSTRATED IN THE SHOW, BOOSTS THE RESEARCH & DEVELOPMENT SECTOR."

AIR CHIEF MARSHAL A.P. SINGH, CHIEF OF THE AIR STAFF, IAF, SPEAKS TO SP'S

PAGE 8

RNI NUMBER: DELENG/2008/24199



ALL NEW - **SP'S MILITARY YEARBOOK 23-2024**
AN **INDISPENSABLE REFERENCE** DOCUMENT: MOST UPDATED INDIA'S WHO'S WHO IN DEFENCE, MOST UPDATED ASIA'S WHO'S WHO IN DEFENCE & MUCH MORE....

RESERVE YOUR COPIES, NOW!

E-MAIL US AT ORDER@SPSMILITARYYEARBOOK.COM

WHATSAPP US AT +91 97119 33343;

CALL US ON +91 11 40042498, +91 11 40793308

CONNECT VIA X: @SPsMYB

WWW.SPSMILITARYYEARBOOK.COM

SP'S MILITARY YEARBOOK 23-2024
CONTENTS HEREWITH

SP GUIDE PUBLICATIONS

PUBLISHER AND EDITOR-IN-CHIEF
Jayant Baranwal
DEPUTY MANAGING EDITOR
Neetu Dhulia
CONSULTING & CONTRIBUTING EDITOR
Manish Kumar Jha
PRINCIPAL CORRESPONDENT
Ayushee Chaudhary
CONTRIBUTORS
India:
Air Marshal Anil Chopra (Retd)
Group Captain Joseph Noronha (Retd)
Swaati Ketkar
Europe: Alan Peaford
CHAIRMAN & MANAGING DIRECTOR
Jayant Baranwal
EXECUTIVE VICE PRESIDENT
Rohit Goel
SR. EXECUTIVE - NEW INITIATIVES
Sarthak Baranwal
MANAGER - HR & ADMIN
Bharti Sharma
DEPUTY MANAGER - CIRCULATION
Rimpy Nischal
GROUP RESEARCH ASSOCIATE
Survi Massey
DESIGN
Holistic Directions: Jayant Baranwal
Sr. Designer: Vimlesh Kumar Yadav,
Designer: Sonu S. Bisht
GROUP DIRECTOR - SALES & MARKETING
Neetu Dhulia
DIRECTOR - SALES
Rajeev Chugh
SP'S WEBSITES
Sr Web Developer: Shailendra Prakash Ashish
Web Developer: Ugrashen Vishwakarma

Subscription/Circulation
Annual Inland: ₹1,200 • Foreign: US$320
E-mail: subscribe@spguidepublications.com
subscribe@sps-aviation.com
LETTER TO EDITOR
editor@sps-aviation.com; expert@sps-aviation.com
For Advertising details, contact:
neetu@spguidepublications.com
rajeev.chugh@spguidepublications.com
SP GUIDE PUBLICATIONS PVT LTD
A-133 Arjun Nagar, (Opposite Defence Colony)
New Delhi 110003, India.
Tel: +91 (11) 40042498, 40793308
E-mail: info@spguidepublications.com
Representative Office
MOSCOW, RUSSIA
LAGUK Co., Ltd., (Yuri Laskin)
Krasnokholmskaya, Nab.
11/15, app. 132, Moscow 115172, Russia.
Tel: +7 (495) 911 2762
Fax: +7 (495) 912 1260

MEMBER / PARTNER OF
NBAA BACA

SP GUIDE PUBLICATIONS
WWW.SPGUIDEPUBLICATIONS.COM

TABLE OF CONTENTS

SP's aviation
AN SP GUIDE PUBLICATION
SHARP CONTENT FOR SHARP AUDIENCE
VOL 28 ISSUE 2 • 2025

COVER IMAGE
Platforms like Aero India 2025 provide a critical opportunity to the Indian Air Force to find cutting-edge sustainable solutions through international collaboration and indigenous innovation
(***Cover Photo**: Indian Air Force)*
COVER DESIGN BY: *SP's Team*

MILITARY

3 **IAF**
Lessons for Airpower

16 **Atmanirbharta**
IAF's Challenges and Key Solutions

23 **Helicopter**
Search for a Medium Lift Helicopter

26 **Industry**
Indian Aerospace Industry at an Inflection Point

INTERVIEW

8 **EXCLUSIVE**
Air Chief Marshal A.P. Singh,
Chief of the Air Staff

12 **EXCLUSIVE**
Sanjeev Kumar,
Secretary, Department of Defence Production

OEM

20 **Boeing**
Boeing's Service Support for Self-Reliance in Aerospace and Defence

22 **RTX**
V2500: Reliable Power for Commercial and Military Operations

25 **Leonardo**
AW109 TrekkerM

REGULAR DEPARTMENTS

2 **From Editor-in-Chief**

30 **Hall of Fame**
Cirrus SR22: Choose CAPS for Safety!

31 **NewsDigest**

BACA Awards 2017
SPECIAL
CONTRIBUTION TO BUSINESS AVIATION

Aerospace Media Awards — Asia
11th February 2020 – Singapore

NEXT ISSUE: *'Year of Reforms'*

It is time again for Aero India 2025, one of the largest airshows in the region, and once again, it promises to be a grand event, bringing together leading aerospace OEMs from across the globe, domestic defence and aerospace manufacturers, political and military leaders, startups, and policymakers to showcase technological advancements and explore new partnerships.

THE ENTIRE AEROSPACE AND DEFENCE INDUSTRY IS GEARING up for India's most significant aviation event, Aero India 2025 from February 10 to 14, 2025, at Yelahanka Air Force Station, Bengaluru, Karnataka. Alongside thrilling aerial displays, Aero India 2025 will feature high-profile events, including the Defence Ministers' Conclave, CEOs' Roundtable, iDEX Start-up showcase, and a global trade fair. Aero India 2025 will also host expert seminars on advanced aerospace and defence topics, including UAV warfare, space-based defence, indigenous innovation, and future conflict strategies. SP Guide Publications will have a significant presence at the upcoming Aero India 2025 show in Bengaluru, India from February 10 to 13, 2025. In case you are making it to the show, we look forward to meeting you all at Hall-K, Stall No. KS3.2.

This issue of the magazine features an exclusive interview of Air Chief Marshal A.P. Singh, Chief of the Air Staff who believes that while concentrated efforts to increase the R&D spend are on-going, the private industry would also need to actively invest in this sector. He also touches upon Aero India 2025, stating it as the embodiment of the whole of nation mission required to develop sustainable war-waging capability and operational stamina in the aerospace domain.

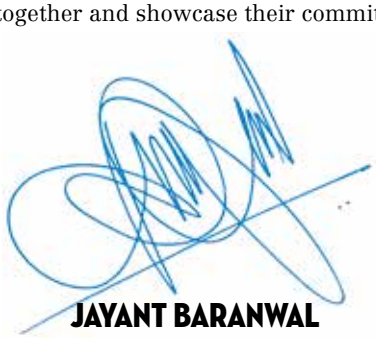
Furthering the country's defence production target of ₹ three lakh crore by 2029, Sanjeev Kumar, Secretary, Department of Defence Production extols that "will continue the policy for defence reforms to boost manufacturing." In an exclusive interaction with Manish Kumar Jha, Secretary, Department of Defence Production speaks on his roadmap and policies for spurring defence manufacturing in India, for both – public and private sectors.

We are extremely pleased to welcome the views of Air Chief Marshal V.R. Chaudhari (Retd) on lessons for Airpower from past and ongoing conflicts around the globe. He emphasises that self-reliance in weapons and critical technologies is a lesson India must prioritise. While no two conflicts are identical, strategic and tactical insights from global military engagements, such as the Ukraine war, can offer valuable lessons in planning, operational support, and force projection. Thoughtful analysis and prudent policy formation will be key to ensuring India's air power remains future-ready.

Aero India 2025 presents an opportunity for policymakers, DRDO, PSUs, and private industry to come together, reaffirming their commitment to strengthening India's aerospace capabilities. The air show serves as a critical platform for the Indian Air Force (IAF) to tackle pressing challenges in force readiness. Air Marshal Anil Khosla (Retd) highlights the urgent need to address shortages in fighter aircraft, force multipliers, and key operational assets—gaps that could impact India's long-term strategic goals. While 'Make in India' and increased defence budgets have contributed to progress, bottlenecks persist in procurement and indigenous production. Accelerating the pace of fighter acquisitions and streamlining production of indigenous platforms is essential for sustaining air superiority.

In another article on the Indian Aerospace sector, Air Marshal R.G.K. Kapoor (Retd) point out that the industry is at an inflection point and that Aero India 2025 is a golden opportunity for all stakeholders, from policymakers to DRDO, PSUs and private industry, to come together and showcase their commitment to not only make India Atmanirbhar in Aerospace but also be a reliable and capable exporter of aerospace products.

All this and more in this issue of *SP's Aviation*. Welcome aboard and we wish you many happy landings!



JAYANT BARANWAL
PUBLISHER & EDITOR-IN-CHIEF

Owned, published and printed by Jayant Baranwal, printed at Kala Jyothi Process Pvt Ltd and published at A-133, Arjun Nagar (Opposite Defence Colony), New Delhi 110003, India.

AIR POWER HAS ALTERED THE COURSE OF SEVERAL WARS BY PROVIDING STRATEGIC ADVANTAGES, TIPPING THE BALANCE IN FAVOUR OF ONE SIDE, AND EVEN ENDING CONFLICTS

LESSONS FOR AIRPOWER

Learning from the Past and Ongoing Conflicts

By AIR CHIEF MARSHAL V.R. CHAUDHARI (RETD)

AFTER 1,000 DAYS OF CLOSELY WATCHING THE RUSSIA UKRAINE conflict, there are probably half that number of articles analysing the lessons of the operations. Strategists, think tanks and military leaders look at it from the political, strategic, operational and tactical levels and no matter which way you look at it, there will always be contrasting views.

THE NEW AGE TECHNOLOGIES

Tacticians have dissected the efficacy of kamikaze drones, the logisticians have analysed the failure of supply chains to keep the armour rolling and the image analysts have examined the bomb damage. New age tech geeks have looked at the 4th gen and 5th gen technologies, particularly those involved in battlefield communications. Journalists have questioned the political motives, alliances and fall outs. Economists debate the effectiveness of sanctions and the oil prices.

New age technologies will always remain at the forefront of any commentary on conflicts. The first Gulf War will always be remembered for the targeting strategies and use of precision weapons along with cruise missiles and stealth platforms. It was indeed the beginning of "Revolution in Military Affairs". But the new technologies of long-range communication and use of GPS for navigation and precision strikes caught everyone's attention and became a part of the 'must have' procurement plans of all militaries. Simplistic Command and Control became C4ISR. The development of newer microchips and enhanced computational power gave rise to integration of myriad systems multiplying their individual capabilities.

PHOTOGRAPH: INDIAN AIR FORCE

IN THE NEW AGE WARS, DOMINANCE OVER SPACE, CYBER AND EM DOMAINS WILL REMAIN KEY TO SUCCESS

AIR POWER IN MODERN INTERVENTIONS

The NATO intervention in Kosovo (Operation Allied Force) had built on the lessons of the Gulf War and introduced new dimensions of air power application. Air power was used to enforce no-fly zones and strike Serbian military targets without a large-scale ground invasion. Air strikes forced Yugoslav President Slobodan Milošević to withdraw his forces from Kosovo and agree to NATO's terms, ending the conflict without the need for a ground invasion This reflected a growing belief in air power as a primary tool for limited military interventions.

The US interventions in Afghanistan (2001-2019) and Iraq (2003-2011) further evolved the role of air power in modern warfare. With insurgencies being the primary threat in both wars, air power adapted to provide close air support to ground forces in counterinsurgency operations. The use of drones and fixed-wing aircraft for precision strikes on high-value targets became crucial. UAVs like the MQ-1 Predator and MQ-9 Reaper transformed air power by providing persistent surveillance and strike capabilities. Drones became a tool for both ISR and targeted killings, allowing for precision strikes with minimised risk to human pilots.

In both Afghanistan and Iraq, the urban environment presented significant challenges for air power. The need to distinguish combatants from civilians in crowded cities made airstrikes more difficult, emphasising the importance of precision targeting and minimising collateral damage. The accidental bombing of civilian targets during the Kosovo campaign (1999), including the Chinese embassy in Belgrade, illustrated the political and strategic challenges air forces face in avoiding collateral damage and managing public perception.

The NATO intervention in Libya (2011) provided new insights into the use of air power in regime-change operations without committing significant ground forces. NATO relied heavily on air power to degrade Libyan military capabilities and support rebel forces on the ground. This model emphasised using air power to tip the balance in a civil conflict. The Libya conflict showed how air power could be applied in low-intensity campaigns with fewer resources compared to major wars like Iraq or Afghanistan, reinforcing the idea that air power could have strategic effects even without large-scale military engagement.

The Syrian conflict (2011- 2024) has been a complex battleground for air power, involving multiple state and non-state actors with competing objectives. Russia's intervention in 2015 demonstrated a different approach to air campaigns, characterised by high-intensity airstrikes on rebel-held areas. Russian air power was decisive in tipping the balance in favour of the Assad regime, showing how air power can be used to support friendly ground forces in a civil war. The Syrian conflict also saw the rise of anti-drone and anti-aircraft systems. The proliferation of man-portable air defence systems (MANPADS) among insurgent groups posed a significant threat to low-flying aircraft and drones. Meanwhile the US conducted a limited air campaign against ISIS in Syria (and Iraq) under Operation Inherent Resolve. This demonstrated the ability to apply air power selectively against non-state actors while avoiding deeper involvement in the conflict.

SYNERGY OF DOCTRINES AND TECHNOLOGY

In the last two decades, new terms began entering our lexicon. "System of systems" thinking implied synergistic application of improved technologies ranging from electronic counter measures, data links, stealth, embedded microprocessors and advanced sensors. Since then, 'battlefield transparency' through near real-time information updates became an integral part of any commander's ops room. A common operating picture was considered essential for decision making.

In the years before the Gulf war, American analysts had convinced the generals that forces with the most advanced or best individual systems may not fare well against forces that have

PHOTOGRAPH: L3HARRIS

THE SUPREMACY OF DRONES AND THE EASE WITH WHICH THEY CAN ALTER THE COURSE OF A BATTLE HAS BEEN SEEN AROUND THE GLOBE

better information and greater ability to plan coordinate and attack accurately. The US and its allies had focussed on not only improving situational awareness, but maintaining information superiority through gaining deep knowledge of the adversaries, nature of the potential threats and use of advances sensors. It is essential that this is not confused with mere technological capability to produce a common operating picture. When the ongoing conflicts are seen through this prism, what emerges is the question, 'did the Russians and the Ukrainians have a 'common operating picture'? If so, were there shortfalls in data collection, or data analysis? Was it due to inadequate sensors or lack of AI supported decision making? Or was it lack of training and exposure to high tech systems of the senior leadership?

While the US and its allies were building up their post war forces based on the lessons of the Gulf war and the conflicts in Kosovo, Syria, Afghanistan, Libya and Iraq, Russia and China began focusing on Anti-access, Area Denial(A2AD) capabilities, based on their own analysis of these campaigns. In the post-Soviet period, a line of Russian military thinking had increasingly played down the centrality of kinetic violence to war. Non-kinetic forms of influence, particularly information influence, had increasingly been interpreted as means of war by Russians. Ideas about a 'new war' had been growing in importance in Russian military and security circles in the years prior to the conflict. This thinking had been generated by top Russian military officers and it emphasised the effectiveness of non-kinetic measures, long-range precision strikes and limited elite force deployment, whilst downplaying the likelihood of large-scale conventional war. After the break-up of the Soviet Union, armed conflicts erupted in Tajikistan, Moldova and Chechnya. High readiness, small units were deployed to quell the violence and their successes strengthened their views on new age conflicts. Russian strategists and senior military officers propagated the importance of information warfare and covert actions and subversion. Its limited action in Syria further cemented this line of thinking.

The initial phase of the present conflict saw kinetic action centred around the use of special ops forces, airborne forces and long-range strikes. The scant logistical support provided to the frontline units along with the tactics of the motorised forces were evidence of this operational plan. While we analyse the final outcomes of this conflict, we will have to weigh the gains and losses against the intellectual merit of the Russian doctrines.

Drones have redefined modern warfare, particularly as reconnaissance assets, yet they face challenges against layered air defences, with Russia effectively using drones for targeting up to 120 km behind the front line

There have been significant advances in technology, doctrine, and strategy from the early 90s to the present-day conflicts. Each conflict has added or subtracted a dimension of air power and also provided valuable lessons and shaped modern air power. In many cases, air power has not only altered the course of wars but has also proven decisive in achieving strategic or tactical victories. From World War II to the Gulf War and the modern conflicts in Kosovo, Libya, and Nagorno-Karabakh, air superiority, precision strikes, and strategic bombing campaigns have been critical in shaping the outcomes of wars.

PHOTOGRAPH: BAYKAR TECH

Advances in technology, including drones and precision-guided munitions, have further solidified the role of air power as a decisive force in contemporary conflicts.

HOW CONTEMPORARY CONFLICTS INFLUENCED AIR POWER

Against this backdrop of contrasting doctrines and strategies, it is essential that we look at the major tactical lessons of the conflicts of the 90's and see how both sides devised their operational plans. This article will focus primarily on the air power aspects and how these were influenced by past conflicts.

The Gulf War (1990-1991) is often considered a turning point in modern air power due to the successful execution of a large-scale air campaign. Some key lessons and developments were the use of Precision-Guided Munitions (PGMs) and the importance of SEAD ops. The Gulf War was a showcase for the effectiveness of PGMs, such as laser-guided bombs. They significantly increased the accuracy of air strikes, allowing for targeted destruction with reduced collateral damage. In the ongoing conflict, the Ukrainians could strike some critical targets and even target top Russian leadership through precision air strikes. Ukraine received more than 300 Storm Shadow and SCALP cruise missiles from European allies and were quick to integrate these on the MiG-29 fighters. Their long-range strike campaign was based on targeting Russian C2 and logistics centers, but these did not have much impact as these strikes never reached the critical level of damage that would disrupt the C2 or logistics systems. The strikes themselves were not effectively synchronised with ground operations that would have halted the Russian offensive. The next priority of the precision strike campaign was to destroy the Russian Black Sea Fleet and to degrade defences on the Crimean Peninsula. In the initial analysis it has been seen that those strikes using Storm Shadow/Scalp in support of the ground operation proved less successful than striking naval targets, where the damage caused was absolute and irreversible.

> New-age conflicts increasingly leverage 'system of systems' thinking, combining electronic countermeasures, data links, stealth, advanced sensors, and real-time information updates to enhance battlefield transparency

Militarily, the targets are easy to determine. Destroying Russia's ammunition dumps, or the fuelling and arming points for its attack helicopters, or Russian tactical-operational missile complexes, would have a useful effect in reducing the casualties being suffered by the Ukrainians. But the targets that will yield leverage in negotiations will primarily be economic and industrial. These would be depth and ideally suited for air force strikes. In this case, the Ukrainians were probably constrained from using NATO supplied weapons for the fear of escalating the conflict.

The impact of precision strike was further mitigated by Russian countermeasures. The munitions that were to deliver these precision effects had been employed for almost a year by the time the offensive began. Whereas Excalibur, for example, was achieving around 70 per cent effectiveness at the beginning of the conflict, by August 2023, it was hitting the designated point only six per cent of the time, a rate lower than non-precision munitions. This was because of exquisite electronic warfare (EW) countermeasures fielded by the Russians.

On the other hand, Russian forces conducted a series of missile and drone strikes of varying sizes, using various combinations of drones, cruise missiles, and ballistic missiles with primary targets being the powerplants, and energy distribution sites. Russian missile attacks had roughly 50 per cent interception rate during the three large-scale Russian missile strikes against Ukrainian energy infrastructure. The increased effectiveness of Russian strikes as the days went by, was not only a result from the accuracy of missiles and drones used in the strikes, but also due to their exploitation of the degradation of Ukraine's air defence umbrella. While Ukrainian AD systems were being bolstered by redeployment of NATO systems, the Russians made use of the window to conserve their precision munitions and use more of their heavy calibre conventional bombs.

TACTICAL LESSONS AND FUTURE DIRECTIONS

Modern air operations, particularly in contested environments like Syria, faced significant challenges from advanced air defence systems. This led to an increased focus on SEAD and electronic warfare. The Russians and Ukrainians had to seek out of the box approaches as conventional SEAD was unlikely to be effective and they needed to think of better alternatives to carry out SEAD. Ground forces were given primary tasks of DEAD using organic firepower. Drones swarming AD, kamikaze drones for DEAD and for carrying out soft kill, were no more fictional concepts.

The Gulf War had highlighted the value of real-time intelligence. Platforms like AWACS (Airborne Warning and Control System) and JSTARS (Joint Surveillance Target Attack Radar System) played a critical role in battlefield awareness and target acquisition. Russia could find targets that were dispersed over a very large battlespace, by increasing the number of sensors networked to its conventional and rocket artillery so that they could receive coordinates directly from UAVs or artillery locating radars. In addition, loitering munitions particularly of the Lancet family were being used in large numbers by Russia.

Drones have occupied a considerable space within the field of defence especially as reconnaissance assets since the extensive use of the Bayraktar TB2 in the 2020 Nagorno-Karabakh war. That conflict demonstrated the apparent supremacy of drones and the ease with which they can alter a battle. However, the same TB2s were relatively powerless against Russia's layered air defences. Russia used a plethora of drones for recce and strikes, but the most effective use of drones was for providing targeting up to 120 km behind the front line for Iskander short-range ballistic missiles.

A major lesson learnt from all the conflicts of this century was that, without careful frequency management, forces are liable to engage in widespread fratricide in the EM spectrum, including degrading the efficiency and survivability of own UAVs. Russian forces were able to update their frequencies every 24 hours, deconflicting UAV orbits. Added to this was their ability to synchronise EW with manoeuvre, particularly with their ground forces. It has been observed that the Russians

had delegated the management of EW capabilities to include counter measures, to the battalion level, while the Ukrainians had delegated it to a higher level. Ukraine found that with their UAVs, a rapid refresh rate of both software and radios was necessary to maintain their effectiveness.

Modern software-defined systems require sufficiently large bandwidths to avoid broad-band jamming, and yet need to have enough spectrum available for the range of systems that are being operated by all the services. Centralised allocation of frequency bands may not be the appropriate solution. Flexibility in the use of spectrum and adaptability to constantly changing ELINT inputs will be the key to success. This is going to become the most important factor in joint planning and needs to take into account the spectrum requirements for civilian usage, mobile communications and limitations of back-up systems. In order to maintain the technological and qualitative edge it may be prudent to equip our systems with hardware that can be replaced at the field level. This can be supplemented by providing the ability to re-programme the radios and data links at unit levels based upon the ELINT inputs.

Analysis of all elements of air power like helicopter ops, combat support ops, fighter strikes and air transport ops would reveal that in the new age wars, dominance over Space, Cyber and EM domains will remain key to success. The characteristics of air power need to be harnessed using the latest tech and innovative tactics. Flexibility, mobility, concentration of force, shock effect, offensive action, and responsiveness can be harnessed for suitable response options in almost all scenarios that we may be faced with. Air power has altered the course of several wars throughout the 20th and 21st centuries by providing strategic advantages, tipping the balance in favour of one side, and even ending conflicts.

CONCLUDING INSIGHTS

Atmanirbharta or self-reliance, especially in weapons will remain a key take away. While many nations gifted Ukraine a significant proportion of their weapons, even at the cost of depleting their own national stocks, this did not amount to a sufficient volume of equipment required. In order for any concept of operations to be executed, a certain minimum number of critical enablers/weapons are required for the planners. A shorter development-integration-deployment cycle has to be created to retain the edge over any adversary.

Drawing an analogy between conflicts or listing out the lessons is never a straightforward exercise. The differences between conflicts will always dwarf the similarities, particularly when historical, geographical and political differences exist. Military leaders should not get trapped in contracted comparisons as they may lead to false expectations. Comparisons and analysis of outcomes can be useful for policy formation when made judiciously. The current war in Ukraine, may offer clear tactical and strategic insights while raising important questions about planning, support, and operations.

As they say, learn from other's mistakes, don't insist on making your own! SP

The author retired as Chief of the Air Staff, Indian Air Force on September 30, 2024.

EXCLUSIVE

"OUR CURRENT R&D BUDGET IS WOEFULLY SHORT"

Air Chief Marshal A.P. Singh, Chief of the Air Staff believes that while concentrated efforts to increase the same are on-going, the private industry would also need to actively invest in this sector

PHOTOGRAPHS: INDIAN AIR FORCE

AIR CHIEF MARSHAL A.P. SINGH (THEN THE VCAS), FLYING THE LCA TEJAS DURING EXERCISE TARANG SHAKTI 2024

AIR CHIEF MARSHAL A.P. SINGH DURING HIS FORWARD AREA VISIT.
THE CHIEF OF THE AIR STAFF IS LEADING THE WAY IN IAF'S TRANSFORMATION DRIVE FOR ADOPTING INDIGENOUS DISRUPTIVE TECHNOLOGIES.

***SP's Aviation* (SP's): How does the CAS perceive the significance of Aero India, primarily a platform catering to the IAF, in showcasing the role of IAF as a global air power to the international air force community?**

Chief of the Air Staff (CAS): I see Aero India 2025, as the embodiment of the whole of nation mission required to develop sustainable war-waging capability and operational stamina in aerospace domain. The mega-event is a global showcase of our preparedness to meet geo-strategic challenges.

The event provides an ideal platform for the IAF to engage with international counterparts, exchange ideas and strengthen relationships that contribute to regional and global stability. Various meets and conclaves held on the sidelines of Aero India, like the Defence Ministers' conclave and the Air Chiefs' Roundtable, provide an opportunity for forging new partnerships and discovering fresh avenues of collaboration.

IAF has been consistently showcasing its prowess and capabilities on global scale. Flawless execution of missions like Op Kaveri, Op Dost etc have proven the capability of IAF to undertake diplomacy through the medium of Air. Last year, IAF conducted the landmark mega-multilateral exercise Tarang-Shakti. The unparalleled participation of 35 nations in this exercise, is a testimony to IAF's professional reputation. Endeavours like these, of which Aero India 2025 is very big part, play a pivotal role in showcasing the might of IAF on the global platform.

Aero India also exemplifies IAF's underlying theme of 'Bhartiya Vayu Sena-Saksham, Sashakt Ewam Atmanirbhar'. As a stakeholder, IAF's involvement in testing, trials and evaluation processes, amply demonstrated in the show, boosts the research and development sector. I am confident that given India's robust economic growth and its zeal for indigenisation and innovation, this event would galvanise the defence aerospace ecosystem.

> "I see Aero India 2025, as the embodiment of the whole of nation mission required to develop sustainable war-waging capability and operational stamina in aerospace domain"

SP's: What kind of coordination should be established between IAF and industry to ensure the successful implementation of key programmes while keeping the primary objectives of IAF paramount and uncompromised?

CAS: The Indian Air Force is committed towards the vision of 'VIKSIT BHARAT – 2047' by supporting Atmanirbhar Bharat initiatives. At present, 48 cases under Make and 75 under iDEX cate-

AIR CHIEF MARSHAL A.P. SINGH WITH GARUDS OF THE INDIAN AIR FORCE.
IAF HAS BEEN CONSISTENTLY SHOWCASING ITS PROWESS AND CAPABILITIES ON GLOBAL SCALE WITH FLAWLESS EXECUTION OF MISSIONS.

gory are already underway. Concurrently, IAF is processing 37 cases as part of the TDF scheme.

To ensure success, it is imperative to establish a framework of close coordination and collaboration between the Indian Air Force, DPSUs and the Indian Private Industry. This entails fostering robust communication channels for seamless information exchange, aligning industry capabilities with IAF's operational requirements and having a common vision for development and absorption of emerging technological advancements. Great feats have been achieved in this sector in recent years. Success stories of various projects like IACCS, LCA, Su-30 aero-engines, LCH, development of sensors like Ashwini, Ashlesha and Arudhra etc are worth emulating. On our cross-hair are upcoming projects such as Astra, Kusha, Akash-NG etc.

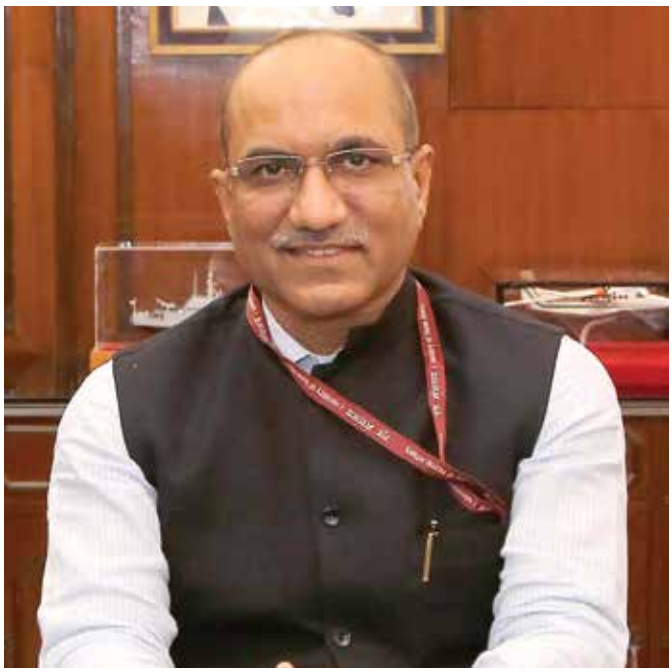
IAF is actively engaging with Indian private industries for procurement of HPR, CIWS, Counter Drone Systems and other defence equipment. Production of 40 x C295 aircraft by Tata Advanced Systems Ltd, is a watershed event in the history of Indian defence aerospace industry.

IAF has been supporting and 'hand holding' the private industries, start-ups and MSMEs by providing access to various airbases during exclusive industry outreach programmes. IAF participated in Defence Expo-24 'MSMEs in Defence' held at Pune, Maharashtra in February 24. Additionally, on the sidelines of Ex Tarang Shakti-24, IDAX-24 was conducted and was attended by dignitaries from friendly foreign countries.

However, to develop defence manufacturing industry at the desired pace, enhanced focus on R&D must become a priority. Our current R&D budget is woefully short. While concentrated efforts to increase the same are on-going, the private industry would also need to actively invest in this sector. Additionally, there is a need to share the ecosystem of testing, evaluation, and certification with Indian private players. This step will go a long way in fostering a culture of R&D and defence manufacturing in India.

> "It is imperative to establish a framework of close coordination and collaboration between the Indian Air Force, DPSUs and the Indian Private Industry"

The Government has done its part effectively by laying out provisions in DAP 2020 and DPM 09 and following it with schemes like IDEX, ADITI, SRIJAN, positive indigenisation list and many other such policies. This, coupled with IAF's transformation drive for adopting indigenous disruptive technologies creates a favourable atmosphere of development for DPSUs and private players. SP



PHOTOGRAPH: PIB

EXCLUSIVE

Furthering the country's defence production target of ₹ three lakh crore by 2029 and leading such initiatives is **Sanjeev Kumar,** Secretary, Department of Defence Production, Ministry of Defence. In an exclusive interaction, Consulting and Contributing Editor **Manish Kumar Jha** speaks with the Secretary, on his roadmap and policies for spurring defence manufacturing in India, for both – public and private sectors.

"WILL CONTINUE THE POLICY FOR DEFENCE REFORMS TO BOOST MANUFACTURING"

A TECHNOCRAT WITH ELECTRONICS & COMMUNICATION Engineering from IIT, Kanpur, he is poised, and well-placed to understand the complexities of military technology and ever-changing dynamics of production in the wake of AI, ML and hybrid/autonomous modern assembly lines. Further, his leadership in designing and launching various national policies and initiatives including the PMAY is highly encouraging that he would be rallying for reforms and efficiency in India's quest for self-reliance not only in the higher scale of defence manufacturing but put his thrust on new emerging and critical technologies.

In this special conversation, Sanjeev Kumar outlines the policies for defence competitiveness globally for Indian industry –private and public, thrust on advanced technology such as engine, propulsion systems and materials and what are the incentives or policy direction to excite R&D in defence industry?

Manish Kumar Jha (Manish Jha): India's defence production reached a record high of approximately ₹1.27 lakh crore. The country's defence production is aimed to reach a target of ₹ three lakh crore by 2029. Could you give the roadmap?

Sanjeev Kumar: The story of India's Defence production in right earnest, started in the year 2014-15 with government focus on 'Make in India' and Atmanirbhar Bharat. The domestic defence production has grown from ₹43,746 crores in 2013-14 to more than ₹1,27,000 crores in 2023-24.

Clarion call given by the Prime Minister for Atmanirbhar Bharat got reflected in the policies of Defence Procurement by reserving 75 per cent of Capital procurement through domestic route under DAP-2020. Support, guidance and acceptance by Indian Armed forces and the response of Indian industries to the products developed by DRDO have resulted in the fruitful realisation of the Atmanirbhar policy.

Further announcement of Positive indigenisation list of more than 5,000 items, simplification of defence industry licenses, relaxation of FDI, launch of Innovations for Defence Excellence (iDEX) etc, strengthened the initiative for Atmanirbhar Bharat.

The establishment of two industrial corridors in Uttar Pradesh

and Tamil Nadu is also helping the cause immensely. Focus on rationalisation of the process for export authorisation and liberalisation of the list of Defence articles available for export is also creating a viable export market for Indian Defence Industries. This developing and vibrant ecosystem is expected to take us to the target of three lakh crores in Defence production by FY 2028-29. Needless to say, our Ministry and Department will continue to fine-tune various policy instruments available at the hands of the Government to promote Indian defence industries.

Manish Jha: Could you talk about the contribution of the private sector in defence production now? Could you please talk about the new policy thrust to spur production?

Sanjeev Kumar: Private sector industries are also playing a very important role in the defence production sector. Our defence production sector was opened to the private sector in 2001 but a major push for the private sector in the Indian defence Industry came in the year 2019 when licensing was relaxed. In the year 2022-23, 25 per cent of funds kept for domestic capital acquisition were earmarked for acquisition from the private sector. In 2024, the Indian private sector has contributed almost ₹27,000 crores in the year 2023-24 in defence production as against ₹14,000 crores in the year 2016-17. Policy measures like streamlining the procurement process, and schemes like iDEX, and ADITI are ensuring a level playing field between the private and public sectors. DRDO is releasing technologies to the private sector. These factors have helped the growth of the private sector in Indian defence industries and their contribution is visible not only in their turnover but also in the number of equipment, systems and sub-systems which they are not now supplying to our armed forces and exporting to various countries. The private sector is very significantly contributing to the preparedness of all three services, that is, Army, Air Force and Navy by providing a wide spectrum of platforms or components used in various platforms. The private sector is spearheading our exports of defence products and their share is 62 per cent of total exports of ₹21,000 crores in the year 2023-24.

Manish Jha: While India's defence exports reached a record high of ₹21,083 crore in 2023-24, what are the policy directions to boost it further amid the highly competitive global market? What are the steps to increase the international footprint?

Sanjeev Kumar: India's Defence export has been a story of satisfaction for all of us. Prime Minister's emphasis on 'Make in India' not only for India but also for the world, has played a motivating and catalytic role. Many policies and administrative measures have been taken in the last decade to increase exports manyfold. Push for indigenisation and resourcefulness of the private sector has played a major role. The contribution of the private sector to defence exports is much more significant. Simplification of export authorisation by the Department of Defence Production (DDP)

SECRETARY, DEFENCE PRODUCTION VISITING INDIGENOUS DEFENCE MANUFACTURING FACILITIES TO ENCOURAGE THE DEVELOPMENT OF NEW DEFENCE TECHNOLOGIES AND FILL THE EXISTING CAPABILITY GAPS

PHOTOGRAPHS: HALHQBLR / X

MINISTRY OF DEFENCE IS IN THE PROCESS OF FURTHER SIMPLIFYING AND RATIONALISING THE SOP FOR EXPORT AUTHORISATION WHICH SHALL HAPPEN THIS YEAR IN THE 'YEAR OF REFORM'

and DGFT along with MHA has gone a long way in enabling exports. The entire authorisation process is online through a portal.

More and more products are allowed to be exported through open general export licenses. We are in the process of further simplifying and rationalising the SOP for export authorisation which shall happen this year in the "Year of Reform" as exhorted by the Defence Minister.

It is also to be noted that defence exports involve multiple stakeholders and importing countries prefer quality equipment trusted and used by our armed forces hence endorsement of our armed forces directly or indirectly plays a very critical role. Support of our armed forces has been commendable in this aspect.

India has the unique opportunity of manufacturing or maintaining the platforms/technologies of both Western and Russian origin. This gives us unique opportunity to export our products or services to the countries using both type of technologies.

Manish Jha: How does the public procurement process boost domestic production for both private and DPSUs?
Sanjeev Kumar: Major role in promoting Indian defence domestic production has been played by procurement process adopted in the DAP 2020. Now 75 per cent of the capital procurement by armed forces is through Indian defence industries.

Further processes like IDDM, Make-1, Make-II, iDEX and ADITI have promoted indigenous development of prototypes and products. Positive Indigenisation Lists of DPSUs and Armed forces have created large assured market for our MSMEs giving them opportunities to be a part of Indian Defence Industry and rise in the value change in coming years.

> "Defence exports involve multiple stakeholders and importing countries prefer quality equipment trusted and used by our armed forces hence endorsement of our armed forces directly or indirectly plays a very critical role"

Manish Jha: Recent reforms of Ordnance factories into DPSUs aim to bring efficiency and higher innovations. Could you talk about their growth in terms of production and revenues?
Sanjeev Kumar: The Ordnance Factory Board was corporatised in the year 2021 and converted into seven new Defence Public Sector Undertakings consisting of 41 factories. Ordnance Factories were supplying equipment and ammunition mostly to the Indian Armed Forces and within a short span of three years since their Corporatisation, these new DPSUs are competing in the market and are being reasonably successful in getting supply orders from the Armed Forces. New DPSUs are also working on improving their delivery schedule. They are also focusing now on the development of new products & improving existing products.

In terms of opportunities, the production of the new DPSUs in the year 2023-24 was ₹18,581 crores and their export is ₹1,977 crores it is clearly seen that their export has risen up significantly.

Manish Jha: Could you elaborate on the advanced technologies especially advanced materials, engine and propulsion systems for Indian defence?
Sanjeev Kumar: We have been focusing

PHOTOGRAPH: DEFPRODNINDIA / X

on the development of new defence technologies and products mainly through DRDO. Now industries, both in the private and public sectors, have also started giving attention to research and development. Gaps in our indigenous defence manufacturing capabilities are well recognised and efforts are being made to bridge those gaps. It is clear that advanced materials and engine propulsion systems are essential defence technologies. These technologies provide an edge to the countries that possess them in developing advanced weapon systems. It is not easy to get "transfer of such technologies" from other countries. The route for developing such technologies indigenously is long and arduous requiring patience and resources along with all-round efforts by all stakeholders including DRDO, other research and development organisations, academic institutions, industries and armed forces. All stakeholders are aware of the need and work has started in the field of many such technologies.

> "The government is encouraging R&D spend in defence by industries by encouraging procurement from domestic industries and operating various schemes for the design and development of new products, systems and sub-systems"

Manish Jha: R&D in production is the key. What are the incentives or policy direction to excite R&D in the defence industry?

Sanjeev Kumar: The government is encouraging R&D spend in defence by industries by encouraging procurement from domestic industries and operating various schemes for the design and development of new products, systems and sub-systems. Under the Make-1 scheme Government funding of up to 70 per cent is available for the design and development of defence equipment and system.

Make-II entails industry-funded R&D with government support in the form of guaranteed procurement. Under the iDEX Scheme, the Government has earmarked ₹498.78 crores, from 2021-22 to 2025-26, for providing financial support to Startups/MSMEs/individual Innovators for developing innovative technology/products. iDEX provides grants/funding up to ₹1.50 crore and other support to carry out R&D which has potential for future adoption for Indian Defence and Aerospace needs. Further, the ADITI (Acing Development of Innovative Technologies with iDEX) scheme with budgetary support of ₹750 crores was launched to provide support with grants of up to ₹25 crores, targeting the development of cutting-edge, critical and strategic technologies. Defence PSUs have also started investing more of their resources in the Design and Development of products and also R&D in niche technology. Private sectors are also increasing their R&D spending. SP

THE INDIAN AIR FORCE (IAF) ALSO FACES GROWING CHALLENGES DUE TO THE RAPID MODERNISATION AND EXPANSION OF BOTH THE PAKISTAN AIR FORCE (PAF) AND THE PEOPLE'S LIBERATION ARMY AIR FORCE (PLAAF)

IAF'S CHALLENGES AND KEY SOLUTIONS

Major industry platforms like Aero India 2025, showcasing advanced aerospace and defence technology solutions, present a crucial opportunity for the Indian Air Force (IAF) to address its operational challenges

By AIR MARSHAL ANIL KHOSLA (RETD)

PHOTOGRAPH: SP GUIDE PUBNS

THE INDIAN AIR FORCE (IAF) FACES SIGNIFICANT CHALLENGES due to shortages in fighter aircraft, force multipliers, and key operational assets, impacting its ability to meet long-term strategic goals. One of the most pressing concerns is the shortfall in fighter squadrons. While the induction of advanced platforms such as the Rafale has boosted capability, the slow pace of procurement and delays in indigenous programmes like the Tejas Mark 2 and the Advanced Medium Combat Aircraft (AMCA) have created capability gaps. The IAF also faces shortages in critical force multipliers such as Airborne Early Warning and Control (AEW&C) systems, aerial refuelling tankers, and drones essential for extending the operational reach and maintaining air superiority in prolonged conflicts. Additionally, the service faces numerous other challenges. Progress remains slow despite efforts to address these issues through the 'Make in India' initiative and increased defence budgets. Bridging these gaps

requires accelerated procurement and streamlined production of indigenous platforms.

The Indian Air Force (IAF) also faces growing challenges due to the rapid modernisation and expansion of both the Pakistan Air Force (PAF) and the People's Liberation Army Air Force (PLAAF), which are enhancing their capabilities through advanced platforms and strategic cooperation. With significant support from China, the PAF has made notable progress in fleet modernisation by inducting advanced fighter jets such as the JF-17 Thunder Block III, equipped with AESA radars and beyond-visual-range (BVR) missiles. The PAF's procurement of Chinese J-10C fighters, featuring advanced avionics and electronic warfare capabilities, has further narrowed the technological gap with the IAF. Pakistan's focus on enhancing its air defence network, integrating long-range surface-to-air missile systems (SAMs), and investing in unmanned combat aerial vehicles (UCAVs) pose asymmetric threats to India's air dominance. Meanwhile, the PLAAF presents an even greater challenge with its rapid expansion and technological advancements. China's deployment of fifth-generation stealth fighters such as the J-20 and an extensive fleet of modern aircraft like the J-16 and H-6K bombers enhances its capability for long-range strikes and air superiority missions. It has even flown the sixth generation prototypes. The PLAAF's focus on network-centric warfare, integrating artificial intelligence, electronic warfare, and space-based assets, gives it a strategic edge. Furthermore, China's expanding airbases in Tibet and Xinjiang, with enhanced infrastructure and support systems, allow for sustained air operations along the Indian border. The combined threat from the PAF and PLAAF places immense pressure on the IAF to modernise its fleet rapidly, enhance its force multipliers, and enhance its operational readiness.

> The Indian Air Force (IAF) faces significant challenges due to shortages in fighter aircraft, force multipliers, and key operational assets, impacting its ability to meet long-term strategic goals

Aero India is a premier aerospace and defence exhibition held biennially in India, serving as a vital platform to showcase the nation's advancements in aviation technology, defence capabilities, and aerospace innovation. Organised by the Ministry of Defence, it attracts global defence manufacturers, policymakers, and military leaders, fostering collaboration and strategic partnerships. The event aligns with India's "Atmanirbhar Bharat" (self-reliant India) initiative, emphasising indigenous manufacturing and technology development. Aero India is crucial in enabling collaborations with global players and enhancing India's defence exports and procurement programmes. The event highlights key emerging trends, including artificial intelligence, space-based defence systems, and unmanned aerial vehicles (UAVs). Overall, Aero India is a crucial event that strengthens India's defence ecosystem and presents an opportunity for the Indian Air Force (IAF) to address its operational challenges by exploring advanced aerospace and defence technology solutions. It would provide a critical opportunity to find sustainable solutions through international collaboration and Indigenous innovation. The IAF must leverage the event to accelerate procurement, foster strategic partnerships, and enhance Indigenous capabilities. Furthermore, global defence suppliers (foreign and Domestic) would gain an understanding of India's military modernisation plans.

MAJOR CHALLENGES FACED BY THE INDIAN AIR FORCE

Squadron Strength Shortfall. One of the most significant challenges for the IAF is the depletion of fighter squadrons. The sanctioned strength of 42 squadrons is essential to counter a potential two-front war scenario. However, the IAF currently operates around 31-33 squadrons, mainly due to the phased retirement of ageing MiG-21s and delays in acquiring replacements. The induction of platforms such as the Rafale has helped, but further acquisitions and indigenous production are crucial to bridge the gap.

Force Multiplier Shortages. The Indian Air Force (IAF) faces challenges in enhancing its force multiplier capabilities, which are critical for maintaining a strategic edge in modern warfare. Force multipliers such as airborne early warning and control (AEW&C) systems, mid-air refuelling tankers, electronic warfare (EW) platforms, drones, and advanced intelligence, surveillance, and reconnaissance (ISR) assets play a pivotal role in extending the IAF's operational reach and effectiveness. However, the current fleet of these assets is limited, constraining the IAF's ability to sustain prolonged operations, especially in high-intensity conflict scenarios.

Dependence on Imported Technology. Despite significant strides in indigenous production, the IAF remains dependent on foreign suppliers for critical platforms, components, and weapon systems. This dependence affects operational readiness and strategic autonomy, making accelerating domestic research and development imperative.

Adapting to Changes in Warfare. The Indian Air Force (IAF) faces significant challenges in adapting to the rapidly evolving nature of modern warfare, characterised by advancements in technology, cyber threats, and the increasing importance of multi-domain operations. The growing emphasis on unmanned systems, artificial intelligence, and network-centric warfare demands a paradigm shift in operational tactics and procurement strategies. Cyber security threats also pose a significant risk, as adversaries invest heavily in electronic and information warfare capabilities. The IAF must enhance its capabilities in space-based surveillance, drone warfare, and electronic warfare to stay ahead in a rapidly changing battlefield environment.

Infrastructure Challenges. The Indian Air Force (IAF) also faces infrastructure challenges that directly impact its operational readiness, modernisation efforts, and ability to respond swiftly to emerging threats. One of the concerns is the airbases, particularly those located in remote and strategically sensitive regions in the northeastern states. Many of these bases require substantial upgrades to support the deployment and maintenance of modern fighter jets. The lack of sufficient hardened aircraft shelters (HAS) and blast pens leaves critical assets vulnerable to enemy strikes, especially in high-tension areas like Ladakh and Arunachal Pradesh. Another challenge is the storage and handling of advanced weaponry and ammunition. Modern air warfare demands the deployment of precision-guided munitions, long-range missiles, and advanced electronic warfare suites, all requiring specialised storage and maintenance infrastructure.

Maintenance and Logistics Challenges. The Indian Air Force (IAF) faces maintenance and logistics challenges impacting operational readiness and efficiency. With a diverse fleet comprising legacy aircraft alongside modern platforms, maintaining a seamless supply chain for spare parts and repairs is a complex task. Dependence on foreign suppliers for critical components often leads to delays due to geopolitical and logistical hurdles. IAF's maintenance, repair, and overhaul (MRO) infrastructure and supply chain management require upgrades to meet the demands of modern warfare.

IAF NEEDS TO BOLSTER ITS FORCE MULTIPLIER CAPABILITIES SUCH AS AEW&C TO MAINTAIN AIR SUPERIORITY IN FUTURE CONFLICTS

EXPECTED SOLUTIONS

To mitigate its challenges, the Indian Air Force (IAF) must prioritise modernisation, self-reliance, and operational efficiency. Investing in indigenous production under the 'Make in India' initiative can reduce dependency on foreign suppliers and ensure a steady supply of spare parts. Strengthening force multipliers such as AWACS, aerial refuelling, drones, and ISR assets is crucial for strategic superiority. Improved logistics management and cyber security enhancements will further bolster the IAF's combat readiness in future conflicts. Upgrading maintenance, repair, and overhaul (MRO) facilities and adopting advanced technologies like artificial intelligence and predictive maintenance will enhance fleet availability. Aero India 2025 will be a convergence point for industry leaders, defence manufacturers, and policymakers to explore solutions to these pressing challenges. Some of the thrust areas include:

Capability vis-à-vis Capacity. Warfighting capabilities and the capacity to sustain operations are both essential. It is a combination of quality and quantity. While the capabilities of Indian air power (e.g., reach, high altitude operations, precision, standoff, all-weather operations, airlift capability, etc) have developed well, the numerical strength of air assets like fighter aircraft, combat enablers, AWACS, AAR, Drones, etc, needs to be increased.

Aircraft Type and Capability. The type of aircraft being used, their capabilities, payload capacity, and mission versatility significantly affect how effectively and efficiently air operations can be sustained. Therefore, a balance between quality and quantity needs to be maintained. In the Indian context, besides inducting the LCA to make up the numbers, an adequate number of advanced fighter aircraft must also be inducted. Aero India 2025 will showcase options for modern fighter jets to augment the IAF's capabilities.

Boosting Indigenous Production. In the long run, Self-reliance is the only way. The Indian Air Force has always encouraged the development of indigenous defence production capability, and it is one of its key result areas. The event will emphasise indigenous defence production under the 'Make in India' and Atmanirbhar Bharat initiatives. It will also focus on partnerships with global defence companies for technology transfer, joint ventures, and local manufacturing of critical systems such as engines, avionics, and radars.

Advanced Force Multipliers. In addition to increasing their numbers, integrating force multipliers seamlessly with combat aircraft and ground-based systems requires advanced networking and data-sharing capabilities. To overcome these challenges, the IAF must accelerate indigenous development, enhance interoperability with allied forces, and invest in cutting-edge technologies such as artificial intelligence and space-based ISR to bolster its force multiplier capabilities and maintain air superiority in future conflicts. Aero India 2025 will provide a platform to evaluate and procure force multipliers such as AEW&C systems, aerial tankers, drones, and enhanced electronic warfare systems.

Unmanned Aerial Systems (UAS) and Drone Warfare. The use of unmanned platforms and systems is growing in warfare. This shift is expected to continue as technology advances and the capabilities of unmanned systems improve further. Drones of various sizes and capabilities are taking over the tasks of conventional platforms. Their use is spread across the entire spectrum of threats, ranging from sub-conventional and conventional to long-range attacks. Investment in anti-drone systems is also a need of the hour. Aero India 2025 will showcase the latest advancements in Unmanned Combat Aerial Vehicles (UCAVs), drone swarms, and counter-drone technologies—Indigenous platforms such as the DRDO's Rustom and Tapas UAVs.

> The development of hypersonic platforms and weapons will likely significantly impact air strategy, providing rapid response and long-range strike capabilities while posing new challenges for air defence

Situational Awareness & Decision Making. One effect of advanced technology on air warfare is the increased pace and intensity of air operations. In such a scenario, the decision-making process must quickly keep up with the OODA cycle. The three most important contributing factors are high situational awareness, a robust and fast network system for information sharing, and AI-based decision-support systems. The solutions may be found in the Aero India.

PHOTOGRAPH: IAF_MCC / X

IAF NEEDS TO HARNESS THE BENEFITS OF BOTH MANNED AND UNMANNED PLATFORMS AND DEVELOP NETWORKED SYSTEMS IN WHICH BOTH CAN WORK IN AN INTEGRATED MANNER

Space-Based Capabilities. The term airpower has changed to aerospace power, with the aerial warfare envelope expanding to the space domain. Space-based systems and applications are embedded in every aspect of aerial warfare. In Grey zone warfare, the involvement of space-based equipment and systems is even larger. Space-based systems are becoming increasingly crucial in air warfare, providing capabilities such as navigation, targeting, communication, early warning of missile launches and space-based surveillance. The integration of these systems with air assets is expected to continue, providing new opportunities for offensive and defensive operations. Aero India 2025 will highlight these solutions and satellite-based intelligence, surveillance, and reconnaissance (ISR), with the possibility of collaboration with ISRO and global space technology firms.

Cyber and Electronic Warfare Capabilities. Aero India 2025 will emphasise the need to strengthen the IAF's capabilities in electronic warfare and cyber defence. Solutions like AI-driven cyber threat detection, electronic jamming systems, and next-generation radar technologies will likely be showcased.

Investment in Technology. The Air Force is a technology-intensive service; converting technology into capability is time-consuming. To stay on top of the challenges, there is a need to invest in emerging technologies and ideate about their use in warfare. Technologies impacting the air war include quantum computing, hypersonic, AI, unmanned platforms (including drones and swarm technology), and a network-centric environment. Defence companies would display new defence systems incorporating these technologies.

Loyal Wing Man Concept. Both man- and unmanned platforms have their respective advantages and disadvantages. The thought process for the next generation of platforms is to harness both benefits and develop networked systems in which both can work in an integrated manner. Research is being done in many countries on the "loyal wingman" concept. HAL is likely to disclose the progress of its CATS Programme.

Hypersonic. The development of hypersonic platforms and weapons will likely significantly impact air strategy. Hypersonic weapons provide new opportunities for rapid response and long-range strike capabilities with precision. They also pose new challenges in terms of protection and air defence. The high speed and unpredictability of hypersonic weapons will require the development of new air defence strategies, as traditional air defence systems may be unable to detect or intercept these weapons. This could lead to the development of new technologies, such as directed energy weapons or advanced sensors, to counter the threat posed by hypersonic weapons. Also, protective infrastructure would be required to withstand these weapons' destructive power. These aspects would find their way into Aero India.

Smart Training Aids. The Indian Air Force (IAF) is leveraging modern training aids such as simulators, artificial intelligence (AI), and virtual reality (VR) to enhance combat readiness and operational efficiency. Advanced flight simulators provide realistic, mission-specific training while reducing costs and wear on actual aircraft. AI-driven analytics help personalise training programmes, analyse pilot performance, and optimise mission planning. VR technology immerses trainees in highly realistic combat environments, improving situational awareness and decision-making under pressure. These cutting-edge training solutions would find a place in the air show.

Smart Logistics and Supply Chain Management. Efficient and reliable logistics networks and supply chains are crucial for providing fuel, ammunition, weapons, spare parts, other critical supplies, and resources to sustain air operations. Well-maintained supply chains are essential for operational readiness and sustaining a protracted conflict. Industry leaders will present solutions to streamline the IAF's logistical operations, including tools powered by artificial intelligence, automated inventory management, and improved supply chain networks to ensure the availability of critical spare parts.

CONCLUSION

Aero India 2025 represents a significant opportunity for the IAF to address its critical challenges and prepare for future readiness. By leveraging cutting-edge technologies, fostering international collaborations, and enhancing indigenous capabilities, the IAF can address the existing gaps. The outcomes of Aero India 2025 will have far-reaching strategic implications for India's air power capabilities. The event will catalyse India's vision of becoming a self-reliant aerospace and defence powerhouse, ensuring a robust, future-ready air force. SP

The author retired as Vice Chief of the Air Staff, Indian Air Force in April 2019.

Aero India 2025 will highlight space-based solutions like satellite-based intelligence, surveillance, and reconnaissance (ISR), with the possibility of collaboration with ISRO and global space technology firms

PHOTOGRAPH: HALHQBLR / X

BOEING'S SERVICE SUPPORT FOR SELF-RELIANCE IN AEROSPACE AND DEFENCE

By **NIKHIL JOSHI,**
MANAGING DIRECTOR, BOEING DEFENCE INDIA

Boeing Defence India (BDI) remains committed to developing in-country capabilities and strengthening its support for India's defence ecosystem

BOEING'S COMMITMENT TO INDIA SPANS OVER 80 YEARS and surpasses that of any other foreign Original Equipment Manufacturer (OEM) in the defence and aerospace sector. The company's investments permeate the entire value chain of Indian aerospace and defence and set the company apart as a steadfast and reliable partner. The acquisition of a defence platform is a strategic decision for the Indian Armed Forces. It is, therefore, telling that today the Indian Armed Forces operate a range of Boeing platforms, including 11 C-17s, 22 AH-64 Apaches (with six more on order), 15 CH-47 Chinooks, 12 P-8Is, three VVIP aircraft (737 airframe) and two Head of State aircraft (777 airframe), making India one of the largest defence markets for Boeing. Several firsts mark the Boeing-India relationship, including India being the first international customer for P-8 aircraft, the largest international operator of C-17s outside the US, and the first US weapon integrated on an Indian fighter with the Harpoon.

In addition, ensuring these platforms' sustained operational effectiveness and unlocking their full potential requires consistent and dependable service support. Boeing plays a key role in enhancing the mission readiness and modernisation of India's defence forces. Established in 2017 as part of Boeing's regional growth strategy, Boeing Defence India (BDI) was created to serve as a vital partner to the Indian Armed Forces. BDI remains committed to developing in-country capabilities and strengthening its support for India's defence ecosystem. This effort is aligned with the 'Make in India' initiative of the Government of India and leverages the significant global technical expertise and product portfolio of The Boeing Company. Our dedication to India is part of a broader strategy that includes establishing similar entities in Australia, the UK, Japan, and Saudi Arabia, to best meet local market and customer needs.

DELIVERING ENHANCED SUPPORT SOLUTIONS

Cost-effective solutions, timely support, and flawless execution are central to BDI's commitment to its customers. As Boeing's dedicated local entity in India, BDI provides holistic lifecycle solutions, including timely maintenance, repairs, and access to technological advancements. These services ensure high fleet availability and mission readiness, enabling the Indian Armed Forces to effectively safeguard national security. What truly stands out is the overwhelmingly positive feedback we are receiving from our defence customers in India on the significant value our platforms and support ecosystem bring to their missions, which fills us with pride and deep satisfaction.

Our integrated logistics support and long-term Performance Based Logistics (PBL) solutions for platforms such as P-8I, Apache, and Chinook, promise to provide the same high level of availability currently provided to the Indian Air Force C-17 fleet through our Globemaster Integrated Support Program (GISP). Our PBL solutions, including Next Generation Product Support, increase efficiency, minimise downtime, reduce lifecycle costs, and enhance war-fighting effectiveness. Globally, customers are adopting PBL solutions for their ability to lower flying hour costs, increase aircraft availability, and maximise local industry involvement.

TOWARDS SELF-RELIANCE

India's aviation sector, now the world's third-largest civil aviation market, is on a trajectory of unprecedented growth, with

PHOTOGRAPHS: BOEING

its fleet size expected to nearly quadruple from 2019 levels by 2041. Supporting this rapid expansion is Boeing's extensive network of MRO partners, the largest in the country, serving both defence and civil aviation manufacturing. The convergence of civil and defence MRO efforts in India represents a strategic approach to transforming the country's civil MRO ecosystem. By combining resources and expertise, we are looking at a more efficient and cost-effective operation that could significantly reduce costs and improve turnaround times. Additionally, it creates opportunities to introduce advanced defence technologies into the civil sector, which could drive innovation and significantly enhance our overall capabilities. This is also an important step towards self-reliance, with the potential to drive economic growth by creating jobs, increasing exports, and attracting foreign investment.

In 2021, Boeing had also launched the Boeing India Repair Development and Sustainment (BIRDS) programme, enabling engineering, maintenance, skilling, repair and sustainment services of defence and commercial aircraft in India. The BIRDS hub is designed as a network of local suppliers, creating a robust MRO ecosystem for defence and commercial aircraft.

This initiative establishes industry benchmarks for maintenance, platform availability, customer satisfaction, and rapid turnaround times. An essential aspect of the hub is training programmes to increase the skilled workforce by developing sub-tier suppliers and medium, small, and micro enterprises (MSMEs) to build high-quality MRO capabilities in India.

Boeing's commitment to strengthening India's aviation ecosystem is evident through its significant infrastructure investments. In 2024, Boeing inaugurated the India Distribution Center in Khurja, Uttar Pradesh, to provide efficient and cost-effective service solutions to regional customers, enhancing fleet utilisation and mission readiness. Other key facilities include the world-class C-17 MRO and training facility at Hindon and the comprehensive P-8I training facility at Rajali, both of which play a vital role in bolstering the operational readiness of the Indian Armed Forces while setting a benchmark for excellence in aviation support services. In 2023, we inaugurated the Ashok Roy Training Simulator Complex at INS Rajali, a cutting-edge facility that minimises the need for actual aircraft in training. Built by Boeing for the Indian Navy, it is one of only four such simulators worldwide and the first in Asia. This 60,000-square-foot facility improves operational readiness by reducing aircraft downtime and enhancing mission system support, troubleshooting, and on-site component repairs.

Additionally, Boeing established an MRO facility in Nagpur, later transferred to Air India in 2015. The C-17 MRO facility at Hindon Air Base, built to international standards, underscores Boeing's investment in state-of-the-art infrastructure. While primarily supporting defence MRO needs, it also holds potential for future civil MRO operations, further expanding its role in India's aviation sector.

COLLABORATING FOR SUCCESS

At Boeing, we believe in the power of partnerships to drive success and innovation in the aerospace industry. Some examples of our partnerships include:

- In 2024, AI Engineering Services Limited completed the first-in-country overhaul of landing gear for the P-8I aircraft. We aim to replicate similar localisation for overhaul of other systems and components.
- Collaborated with Air Works to complete Phase 32 maintenance checks on eight P-8I aircraft operated by the Indian Navy (IN), showcasing maturity and scale comparable to established global MRO hubs.
- Partnered with Horizon Aerospace for defence platforms, including the P-8I and VIP 737 transport fleet, improving turnaround times and operational readiness.
- Formed a strategic agreement with AI Engineering Services Limited for the MRO of Boeing 777 Air India One aircraft.

(LEFT-RIGHT) BOEING DEFENCE INDIA (BDI) PROVIDES HOLISTIC LIFECYCLE SOLUTIONS, INCLUDING TIMELY MAINTENANCE, REPAIRS, AND ACCESS TO TECHNOLOGICAL ADVANCEMENTS

In a further effort to enhance MRO capabilities, Boeing is inviting leading foreign MROs to India to evaluate Indian MROs for component repair and to explore potential partnerships. This exchange of expertise and knowledge will contribute to the growth and development of the MRO sector in India.

We are excited to continue our journey with India, shaping the future together, and supporting India's goal of becoming Aatmanirbhar in aerospace and defence. Boeing will continue to invest in local manufacturing, co-production, co-development, skill enhancement, and innovation to foster growth across the aerospace, defence, and commercial aviation sectors. SP

V2500: RELIABLE POWER FOR COMMERCIAL AND MILITARY OPERATIONS

With nearly 300 million flight hours accumulated by the V2500 series, the engine has a proven track record of durability

(LEFT) V2500-E5 ENGINE; (RIGHT) AVT02151 ENGINE.

WHEN IT COMES TO MODERN STRATEGIC AIRLIFT CAPABILITIES, flexibility is key. The C-390 Millennium, powered by the adaptable and powerful IAE V2500-E5 engine, is an example of a versatile transport aircraft that delivers multi-mission functionality.

THE V2500-E5: POWERING THE C-390'S PERFORMANCE

Powering the C-390's outstanding performance is the IAE V2500-E5 engine. Designed to provide a thrust of 31,000 pounds, this engine delivers efficiency, reliability, and a significantly reduced environmental footprint. Whether taking off from a rough, unpaved runway in a remote area or flying at altitudes up to 14,000 feet, the V2500-E5 ensures the C-390 operates smoothly under even the most challenging conditions.

For the Indian Air Force, which often conducts missions from high-altitude airfields, the V2500-E5 offers a critical advantage. Its high thrust capability combined with operational reliability allows the C-390 to perform a variety of tasks that require both power and precision.

A PROVEN ENGINE WITH A LEGACY OF EXCELLENCE

V2500-E5 engine's success is no coincidence. It is a variant of the V2500 engine family, which has a proven record of powering aircraft known for their performance and reliability. With nearly 300 million flight hours accumulated by the V2500 series, the engine has a proven track record of durability.

Notably, only a limited number of V2500 engines have required their first maintenance visit, which is proof of the engine's long operational lifespan. This is beneficial for military operators, where maintaining mission readiness is crucial, and downtime for repairs or maintenance must be minimized. With the V2500-E5, the C-390 is more than just a reliable aircraft—it's a dependable asset that can perform under pressure without the constant need for repairs or overhauls.

CUSTOMIZABLE SUPPORT AND LONG-TERM SERVICE SOLUTIONS

The support infrastructure behind this engine further solidifies its value to operators. One of the standout benefits of the V2500 engine is access to a well-established global service network.

Pratt & Whitney also offers highly customizable service packages, tailored to the financial and operational needs of each customer. Services also include programs for new and serviceable materials, LLP (Life-Limited Parts) solutions, and even engine replacements.

THE FUTURE OF THE V2500

The engine's proven durability, paired with the global support network, ensures that V2500 fleets already in service will continue to operate effectively in the years ahead. Additionally, new V2500-E5s continue to be manufactured for the C-390 Millennium. SP

— Ashmita Sethi, President & Country Head, Pratt & Whitney, India, an RTX Business

PHOTOGRAPHS: RTX

ATMANIRBHARTA: HAL HAS PLANS TO PRODUCE MORE THAN 1,000 HELICOPTERS IN THE RANGE OF 3-15 TONNES OVER A PERIOD OF 20 YEARS

SEARCH FOR A MEDIUM LIFT HELICOPTER

The Indian Multi-Role Helicopter (IMRH), offering diverse capabilities, is being developed to cater to both military and civilian applications

By MAJOR GENERAL ATANU PATTANAIK (RETD)

THE SEARCH FOR REPLACEMENTS FOR THE AGEING FLEET OF helicopters in the armed forces began over three decades back. The light helicopter fleet of French origin Chetak and Cheetahs were inducted way back in 1970s. The soviet origin Mi series of medium lift helicopters (Mi-17/Mi-17IV/Mi-17V5 and Mi-8s) also needed replacements in phases. Some RFPs reached trials stage by 2003-4 including flight tests in the high altitude terrain of Leh and Siachen where the helicopters are the workhorse for induction and sustenance in these remote locations. However, as is the case with many high value procurement proposals, these didn't fructify beyond the price negotiation stage for a variety of reasons. The AgustaWestland VVIP chopper deal which involved a multimillion-dollar corruption case amounting to ₹2.5 billion ($29 million), transferred through bank accounts in the UK and UAE and paid to middlemen and Indian officials in 2006 and 2007 got exposed in 2013 leading to much hesitation to progress further procurements for urgent tri-service needs.

INDUCTION OF ALH AND SAFETY CONCERNS

In a parallel development, the much delayed Advanced Light Helicopter (ALH) Dhruv designed and developed by Hindustan Aeronautics Limited (HAL), a project initiated way back in November 1984, finally began to enter service in 2002. As of January 2025, more than 400 Dhruvs had been produced for domestic and export markets logging more than 3,50,000 flying hours. It was supposed to be a symbol of India's growing self-reliance in defence—a sleek, home-grown military helicopter capable of handling diverse missions across land, sea and mountains. Instead, the Dhruv, has found itself mired in a troubling pattern of crashes, raising serious questions about its safety, design and reliability. The helicopters have been involved in 15 crashes over the past five years. The latest on January 5, 2025 when an ALH of the Indian Coast Guard (ICG) crashed near Porbandar, Gujarat killing all three crew. After the latest crash, the entire fleet of around 330 ALHs in service have been grounded for safety checks.

PHOTOGRAPH: SP GUIDE PUBNS

The crisis with Dhruv helicopters is a dampener for government's ambitious 'Make in India' project of Atmanirbharta in the defence sector. When the Indian military inducted these choppers, the moment was seen as a milestone for indigenous defence aviation. The ALH has since been exported to multiple nations and has undergone several upgrades, leading to advanced variants such as ALH Mk III and ALH Mk IV (Rudra). The ALH Mk III features a Shakti engine developed in collaboration with France's Safran, a glass cockpit, night vision capability, advanced marine patrol radar and an electronic warfare suite. The ALH Mk IV is an armed variant equipped for attack, close air support and high-altitude operations.

Safety probes have identified issues with hydraulics and control rod failures impacting rotor blade power input, prompting the replacement of defective rods across the fleet. The control rod in ALH is made of aluminium and HAL decided to replace it with steel control rods in some helicopters. In the latest crash of January 5, 2025, the Council of Scientific and Industrial Research – National Aerospace Laboratories (CSIR–NAL), Bengaluru has found that swashplate assembly in the transmission system compromised the pilots' ability to control the helicopter's motion. These safety issues have cast a shadow over its operational credibility. It is hoped that greater technological partnership, especially with the burgeoning private sector defence industry and collaboration with French and the US aviation giants, which have progressed well in the past few years, will see these issues resolved.

> The grounding of all Dhruv helicopters is a dampener for government's ambitious 'Make in India' project of Atmanirbharta in the defence sector

GOING THE "INDIGENOUS" ROUTE

In other segments of the helicopter fleet in the services, the induction of the Boeing AH-64E Apache attack helicopters and CH-47F (I) Chinook heavy lift helicopters by the IAF in 2019 was a momentous milestone and augmented urgently needed capabilities. The IAF's helicopter fleet has steadily been increasing over the years, going up from a handful of US types in the sixties to over 500 French, Indian and Soviet built types. The Russian Mi-26, however, remains the potent force in the IAF's heavy lift helicopter capability.

In the medium lift utility helicopter category, the HAL has made substantial progress even as it struggles with the above mentioned safety issues with the light utility helicopter Dhruv. The Indian Multi-Role Helicopter (IMRH) is being developed to cater to both military and civilian applications. It is expected to offer capabilities such as troop transport, search and rescue, air-attack, anti-surface, anti-submarine warfare, electronic warfare, and VIP transport roles. IMRH will be the first major project to follow new manufacturing policy under Defence Acquisition Procedure (DAP) 2020. As per the policy, a private sector entity will form Special Purpose Vehicle (SPV) with HAL by acquiring 51 per cent stake after getting minimum order assurance from Indian Armed Forces. During delivery, the company will be free to export 25 per cent of the production to a third country. An estimated ₹11,000 crores will be required as development cost for seven years and another ₹12,000 crores for setting up manufacturing facilities. The total requirement of the Indian Armed Forces is 550 units. The IAF currently operates a fleet of over 220 medium lift helicopters, Mi-17 and its variants Mi-17IV and Mi-17V5, primarily used for utility and troop transport.

The IMRH helicopter will have a five bladed main rotor with a diameter of 21.2 meters and a four-blade tail rotor. MRH will have 75 per cent domestic content but will use an imported 2000 kW turboshaft engine. French aviation giant Safran Helicopter Engines and Hindustan Aeronautics Limited (HAL) signed a workshare agreement on February 15, 2023 at Bengaluru for the joint development of the engine intended for the future 13-tonne IMRH and its naval version DBMRH (Deck Based Multi-Role Helicopter). Payload capacity at sea level will be four tonnes and 1.5 tonne at a height of 13,000 ft (4,000 m). The cabin dimension allows up to 36 passengers in three rows and meets the specified mission requirements and should be able carry an internal cargo of 4,000 kg. An external hook is to be provided to transport cargo up to 4,000 kg as an optional fit.

HAL has set up a new Helicopter Factory at Tumkur that will produce helicopters of three tonne to 12 tonne category. Inaugurated in February 2023, the HAL plant has plans to produce more than 1,000 helicopters in the range of 3-15 tonnes, with a total business of over Rs four lakh crores over a period of 20 years. The factory will enable India to meet its entire requirement of helicopters without import.

ROLE OF THE PRIVATE SECTOR

Instead of relying solely on the PSU manufacturer HAL, the government has given the go-ahead to multiple private sector initiatives in the aviation sector to boost indigenous capacities. Tata Boeing Aerospace Limited, a joint venture between Tata and Boeing produces aero-structures for Apache helicopters and Boeing 737 airplanes in Hyderabad. The Tata-Airbus plant in Vadodara will manufacture C295 defence transport aircraft, the first private sector final assembly line for military aircraft in India. From making the C295 military transport aircraft in India to making a civil commercial aircraft indigenously will be a very long and complex pathway, but India has announced its grand ambition for a Made-in-India civil aircraft.

French defence major Dassault Aviation has filed an application with the Indian government to set up a maintenance, repair and overhaul (MRO) facility near Jewar international airport in Uttar Pradesh to cater to not just India's fleet of Mirage 2000s and Rafale fighter jets, but also that of Indonesia. Mahindra Aerospace has led the Mahindra Group's foray into utility aircraft and aerostructure manufacturing since 2008. Its utility aircraft business, based in Australia, currently produces the Airvan 8, the most capable, rugged and versatile utility aircraft in its class. Certified in 38 countries, over 200 are in service. Mahindra Aerospace is also developing a 10-seat turboprop, the Airvan 10 The Aerostructures business operates out of a new 25,000 sq. m. facility located at the Narsapura Industrial Estate, about 40 km east of Bengaluru city.

These are very exciting developments Indian aviation sector. This developing ecosystem will help immensely in development and production of military and civil use aircrafts, helicopters and drones of the future, giving much needed fillip to the Prime Minister's vision of 'Atmanirbhar Bharat'. SP

The author retired from the Indian Army after 37 years of experience as a helicopter pilot.

AW109 TREKKERM

Leonardo's state-of-the-art multi-role military light helicopter

THE AW109 TREKKERM REPRESENTS THE PEAK OF LEONARDO'S established leading role in the light twin helicopter market in terms of modern design and versatility. Building upon the legacy of the popular AW109 series, with over 1.600 units sold in multiple variants globally, the AW109 TrekkerM continues to uphold the standards of excellence that have defined this product line over time.

Performance - The AW109 TrekkerM is designed to operate in the most challenging environments, delivering excellent performance even in "hot and high" conditions. Its rugged design, compact footprint, and skid landing gear make it adaptable to a wide range of missions, ensuring true multi-role capability. Two Pratt & Whitney Canada PW207C turbine provide power and versatility, enabling the helicopter to reach speeds up of 148 Knots.

As a three-ton class helicopter, the AW109 TrekkerM is ideally suited for a broad spectrum of battlefield missions, including troop transport, cargo resupply with cargo hook, Casualty Evacuation/Medical Evacuation (CASEVAC/MEDEVAC), Search and Rescue (SAR), Command and Control (C2), armed escort, and special forces operations.

Technical Features - The helicopter features a wide and unobstructed cabin that can be rapidly reconfigured to meet various operational needs. It accommodates fully equipped troops, and large sliding doors provide exceptional access for rapid ingress and egress, as well as for hoist operations and fast-roping during hovering. Crew-served weapons mounted on the cabin doors allow for wide-area threat suppression.

Advanced technology and safety are central to the AW109 TrekkerM 's design. The low-workload single/dual-pilot VFR/IFR integrated glass cockpit - result of the evolution of integrated digital avionics component across the Leonardo's product range - features advanced systems to provide excellent situational awareness. A Synthetic Vision System (SVS), Highway In The Sky (HITS) depiction, moving map, and embedded Helicopter Terrain Avoidance Warning System (HTAWS) all enhance safety.

> Leonardo's AW109 TrekkerM exemplifies the company's global leadership in the light-twin helicopter category, delivering exceptional performance and versatility across diverse military missions worldwide

The AW109 TrekkerM has a comprehensive suite of mission equipment, including a Defensive Aids Suite (DAS), multiband radios, Electro-Optical/Infrared (EO/IR) devices, searchlight, loudspeakers, hoist, and cargo hook.

Training Capability - Leonardo offers comprehensive training solutions for the AW109 series, including the TrekkerM variant. The company's Training Academies provide a range of courses tailored to the needs of pilots and maintenance personnel. These programs utilize advanced simulators and training devices to ensure proficiency in various operational scenarios, thereby enhancing safety and mission effectiveness.

In summary, the AW109 TrekkerM by Leonardo is a state-of-the-art military helicopter that offers unparalleled performance, cutting-edge technology, and exceptional versatility to meet the demands of various missions. SP

PHOTOGRAPH: LEONARDO

INDIAN AEROSPACE SECTOR HAS MADE REMARKABLE PROGRESS OVER THE LAST ONE DECADE SINCE THE ADOPTION OF 'MAKE IN INDIA' AND 'ATMANIRBHAR BHARAT' BUT CHALLENGES REMAIN

INDIAN AEROSPACE INDUSTRY AT AN INFLECTION POINT

Aero India 2025 is a golden opportunity for all stakeholders, from policymakers to DRDO, PSUs and private industry, to come together and showcase their commitment to not only make India Atmanirbhar in Aerospace but also be a reliable and capable exporter of aerospace products

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

PHOTOGRAPH: SP GUIDE PUBNS

THE NATION IS GEARING UP FOR THE 15TH EDITION OF AERO India, the biennial air show held at Bengaluru. It is also amongst the largest air shows in Asia. From its humble beginnings in 1996 when 22 countries participated and 65 aircraft were on display, the air show has gained tremendous popularity. Aero India 2023 attracted 809 exhibitors from over 100 countries and this edition is expected to surpass these numbers. India's aerospace sector is undeniably at an inflection point-rapidly evolving through advancements in technology, strategic collaborations, and an increasingly robust domestic manufactur-

ing ecosystem. India from traditionally being the leading arms importers in the world for many years is now placed among the top 25 exporters of arms in the world, thanks to the growth in domestic defence industry.

Beginning with participation of only the IAF aircraft in the first Aero India, this edition will witness participation of air arms of all three services. Aerospace power has been the primary tool of national power since World War II, this is highlighted by the growing air arms of both, Army and Navy. Add to this attractive market is the tremendous growth in civil aviation in the country. The commercial airlines presently operate around 822 aircraft, this number is likely to go up to 3,800 in next 20 years.

Major events planned during the air show are, Defence Minister's conclave, CEO's roundtable and events by the Indian Air Force, Indian Navy and Indian Army. Bilateral meetings are planned for the Defence Minister, Chief of Defence Staff, Chiefs of the IAF, IN and IA with their counterparts. Bilateral meetings are also likely between Leadership in MoD, DRDO, PSUs, Private industry with their counterparts from participating nations. This would be an ideal platform to signal the nation's intent to the world that Indian aerospace sector is inclusive and ready to collaborate and produce quality products for the world market.

IAF is presently deficient of 12 fighter squadrons, Navy is looking for carrier-based fighter aircraft and hundreds of helicopters are required for the three services. Indian Multi Role Helicopter (IMRH) and Medium Transport Aircraft (MTA) are two important projects. Additionally, thousands of UAVs along with diverse weapon systems for both fighters, helicopters and UAVs will be required in coming years. This is a lucrative market which is ready to take off. The slogan for the Aero India was chosen in 2019, "The Runway to a Billion Opportunities", perfectly fits the expected outcomes for the present edition.

Air Chief Marshal A.P. Singh, Chief of the Air Staff, IAF during a recent seminar stated that it took Tejas 17 years to fly after the project was conceived in 1984, thereafter induction started 15 years later and all 40 aircraft have still not been delivered to the IAF. This is a golden opportunity to showcase the progress made in LCA Mk2 and display of LCA Mk1A. It is extremely important to assure the world that Indian aerospace products are reliable, competitive and produced to strict timelines.

Defence Minister has declared year 2025 as the "Year of Reforms". The timing of hosting Aero India is coinciding well with this theme. Initial thoughts about the way forward in refining acquisition procedures, capability development vision, technology transfer expectations, public-private partnership roadmap and collaboration with international OEMs are likely to be discussed during business meetings. This should inspire confidence and create a favourable investment and technology transfer environment. As per last available reports more than 700 exhibitors, including more than 140 exhibitors from foreign countries have registered for the air show.

The present Indian contribution to the global aerospace sector is miniscule; however, the rapid growth witnessed by this sector enthuses confidence that the Indian aerospace industry is now poised for a giant leap in garnering growing share of this lucrative market

TRANSFORMATION OF AEROSPACE INDUSTRY

Indian aerospace sector has made remarkable progress over the last one decade since the adoption of 'Make in India' and Atmanirbhar Bharat. This transformation is visible in military, civil and space sectors. Government approval of Venture Capital of ₹1,000 crores in space sector has provided the much-needed impetus since, space will be highly congested and contested in the future. Innovation in technologies both in aerospace sector are imperative for the nation.

Private industry is developing and producing world class weapons along with DRDO. Liberalisation of policy on certification and export would help the private industry. Additionally, major international players should be allowed to tie up with Indian industry in developing and producing weapons for the domestic and international market. News of MBDA tying up with L&T on Meteor Air to Air missile is encouraging. This will provide diverse options and assist faster development of weapons for air to air and air to ground roles. Joint ventures have provided the private industry the launchpad for further growth and development.

The impetus provided to private industry and growth of industry partners in Tier 2 and Tier 3 cities has created a vibrant ecosystem. The Indian aerospace industry has witnessed a growth of almost 20 per cent since 2004. India's domestic defence production was valued at ₹1.27 lakh crores in 2024, an increase of 16.7 per cent over 2023. More than 14,000 MSMEs and 350 startups are presently engaged in defence production. Even after delayed entry the private industry contribution stands at 21 per cent which is no mean an achievement. The time has come to now catapult from manufacturing small components and products at lower level of technology to producing modern systems and platforms.

KEY TRENDS

There is clear indication that the aerospace industry in India is fast approaching its inflection point.

- **Growth in Domestic Aerospace Manufacturing:** All major PSUs like HAL, BEL, BDL have enhanced their manufacturing capacities as more systems are indigenised. Private manufacturers like L&T, Mahindra Aerospace, Adani Defence & Aerospace, Tata Advanced Systems Limited, Reliance Defence and Bharat Forge have started manufacturing complex systems and weapons developed by DRDO or through JVs. LCA Mk1/1A and Mk2, Light Combat Helicopter (LCH), Light Utility Helicopter (LUH), Akash Air Defence Systems and myriad types of radars and electronic systems are examples of enhanced capability and capacity. These companies are also working on critical technologies like Combat Air Teaming System, AI and Drones.

Indian MSMEs have demonstrated their capability to manufacture components to global standards. The capacity of these units has also grown, and it provides a cost-effective quality product. Today, production of aerospace products is reliant on global supply chains. This gives our MSMEs a fair chance to compete.

- **Policy and Strategic Initiatives by the Government:** The government has taken many steps like releasing the National aerospace policy (2021), liberalisation of FDI in defence, Space policy (2020), Drone policy (2021). Establishment of defence industrial corridors in various states and incentives for setting up aerospace industry combined with improvements in infrastructure and review of procedures is driving the growth of this ecosystem. Increasing exports and consumption in domestic markets has spurred competition. Government impetus to private sector participation will further encourage competition. Many private players have started selling drones and weapons to armed forces and are also exporting these.
- **Technological Evolution and Innovation:** Developments and innovations in areas like Artificial Intelligence (AI), Cloud and quantum computing, robotics, big data analytics, autonomous systems, composite materials, avionics and electronic warfare systems are being undertaken by both DRDO, PSUs and private industry. While the nation is at a nascent stage in many of these technologies primarily because of our dependence on semi-conductors, these areas will define the trajectory of Indian aerospace industry. Startups in space sector have rapidly grown and are ready to provide cost effective and efficient solutions in satellite manufacturing and ISR.
- **Growth of Civil Aviation:** India has a rapidly growing commercial and private aviation market. UDAN scheme has resulted in tremendous growth of airports in tier 2 and 3 cities thus providing air connectivity. According to report by Deloitte, India is seventh largest civil aviation market in the world. More than 1,000 aircraft are under order. About 200 to 300 aircraft will have to undergo major maintenance checks every year. Presently, 90 per cent of Maintenance Repair and Overhaul (MRO) requirements are being met through imports. The nation can save more than $2.0 billion every year, and provide thousands of jobs by setting up MRO facilities in India. The MRO industry was worth $1.7 billion in 2021 and is expected to become worth $4.0 billion by 2031 growing at an impressive CAGR of 8.9 per cent against a global average of 5.6 per cent.
- **Collaborations and Partnerships:** Entry of international majors in Indian aerospace market through JVs has provided a fillip to domestic manufacturing even though it is to a design provided by the OEM. The next phase would be R&D as these companies get orders. BrahMos, Boeing-HAL, HAL-Safran, Tata-Airbus, Tata-Boeing, Adani-Thales and Elbit, Mahindra-Embraer, Reliance-Dassault, BEL-Israel Aerospace Industries (IAI) are some examples of successful JVs. These JVs should ultimately lead to joint development and production.

IT IS EXTREMELY IMPORTANT TO ASSURE THE WORLD THAT INDIAN AEROSPACE PRODUCTS ARE RELIABLE, COMPETITIVE AND PRODUCED TO STRICT TIMELINES

PHOTOGRAPH: INDIAN AIR FORCE

India from traditionally being the leading arms importers in the world for many years is now placed among the top 25 exporters of arms in the world, thanks to the growth in domestic defence industry

EXPECTATIONS FROM AERO INDIA 2025

The growth in aerospace sector and increasing domestic and export markets raise expectations from this edition of Aero India. The strategic partnerships, innovations, growth of MSMEs and private industry along with rising defence requirements of India and the world have placed Indian aerospace industry at an inflection point, from where favourable climate will spur growth and make the nation truly Atmanirbhar in aerospace sector.

It is an opportunity to attract FDI in aerospace sector, something which has not taken off so far. There also exists an opportunity to communicate the resolve that the government is committed to supporting private industry and MSMEs. Discussions could also be taken forward with international majors on collaboration in aero engine technology and other critical systems where our technological capability is nascent.

This Aero India is an opportunity for the MSMEs and startups to display their innovations and create business opportunities with international aerospace companies. Indian domestic industry can achieve self-sustenance by leveraging the business opportunities offered by international majors. Aerospace market is facing increasing competition, Indian industries with their low cost can attract larger share of international business through joint ventures.

HAL has done reasonably well in helicopters and BEL along with private industry is expanding in radars and electronic systems. HAL is developing IMRH, this could be an opportunity for India to invite another country with a similar requirement in development and production. This will enhance future possibility of export to other countries. Also, HAL has good experience and capability in producing and overhauling aircraft of myriad origins, it could provide a viable and economical major overhauling option for common fleets in Asia and Africa region by entering into a MoU with OEMs.

Drones are now ubiquitous in their employment. Drone industry is wit-

TIME HAS COME TO CATAPULT FROM MANUFACTURING SMALL COMPONENTS AND PRODUCTS AT LOWER LEVEL OF TECHNOLOGY TO PRODUCING MODERN SYSTEMS AND PLATFORMS

nessing a technological revolution. There has been tremendous growth in this sector and many Indian companies have made their mark in this domain. The global drone market was worth $31.02 billion in 2024 and is expected to become $87.5 billion by 2033, with an expected growth rate of more than 10 per cent. Indian drone market is expected to grow from $654 million in 2024 to $1,437 million by 2029, at a CAGR of 17.0 per cent. The total requirement of drones in India is likely to reach 62,000 pieces by 2029. This is a huge lucrative market. The drone industry can leverage the Aero India platform to showcase their products which meet armed forces and commercial requirements. DJI of China is the major supplier of drones in India, this market could be captured by domestic industry by developing competitive products. A separate slot for drone demonstrations could be sanctioned during the show. Indian companies should use this opportunity to tie up joint ventures with international companies to provide cheaper MALE and HALE drones.

Simulation plays a critical role in aviation training. The quality of simulators has improved exponentially. Indian manufacturers have demonstrated their capabilities to produce modern simulators. As the cost of flying rises further and complexity of aircraft evolves simulators will gain importance. This is another area in which domestic industry could collaborate with international partners to provide global solutions.

The space sector is rapidly expanding. Companies and startups in this sector have grown manifold and hold tremendous promise. This could be leveraged in Defence Minister's conclave, other events and bilateral meetings. The sector has government's blessings in form of a ₹1,000 crore venture capital. The global market for Intelligence Surveillance and Reconnaissance (ISR) products was about $42 billion in 2024 and is likely to grow at CAGR of 5.6 per cent to $71.2 billion by 2034. India with its cost-effective solutions is ideally positioned to make its mark in this sector.

> **Aero India 2025 would be an ideal platform to signal the nation's intent to the world that Indian aerospace sector is inclusive and ready to collaborate and produce quality products for the world market**

Aero India will bring together major industry partners and OEMs who could discuss setting up MRO facilities for commercial and military aircraft in India.

Hosting Aero India this year can't be timelier for the government, DRDO, PSUs and private industry as it brings diverse players from across the globe on a single platform. Asian, Latin American and African countries have growing requirements for aerospace products with applications in civil and military sectors. HAL has produced enough two-seater versions of LCA Mk1. This is an ideal opportunity for us to take selected visitors from friendly foreign nations for familiarisation sortie on the Tejas during the show. Similarly, the HTT-40, LCH and LUH must be utilised in our outreach programme.

The present Indian contribution to the global aerospace sector is miniscule. The rapid growth witnessed by this sector enthuses confidence that the Indian aerospace industry is now poised for a giant leap in garnering growing share of this lucrative market. Assurance by the government on this platform of higher allocation for R&D to DRDO and private industry will accelerate technological growth which will provide a platform for our industry to compete globally.

The government must vigorously pursue exporting LCA Mk1A with domestic radar and avionics, Light Combat Helicopter, Light Utility Helicopter, Akash and Medium Range Air Defence Systems, Drones, BrahMos Surface to Surface missile system, Small satellites and imagery, Air to Ground weapons, Astra Air to Air missile, Counter drone systems and variety of radars manufactured both by BEL and private companies, etc. India has rapidly moved up in export rankings and presently is in top 25 arms exporting nations. Aero India 2025 is taking place at a time when the Indian aerospace industry is at its inflection point not only make India truly atmanibhar but also provide modern aerospace products to the world.

CONCLUSION

Indian aerospace industry is at a defining juncture. Aero India 2025 is a golden opportunity for all stake holders, from policy makers to DRDO, PSUs and private industry to come together and showcase their commitment to not only make India Atmanirbhar in aerospace but also be a reliable and capable exporter of aerospace products. This event should become the platform for next phase of growth in aerospace sector and our vision of aerospace industry in coming decades. The success of Aero India would be measured by the number of MoUs, contracts and JVs signed by companies and PSUs within and outside the country. All efforts must be made for this edition to become the harbinger of India becoming a preferred exporter of aerospace products to the world. SP

The author retired as Air Officer Commanding-in Chief of Central Air Command, Indian Air Force on August 31, 2024.

PHOTOGRAPH: HALHQBLR / X

CIRRUS SR22: CHOOSE CAPS FOR SAFETY!

Cirrus Aircraft and COPA set out to create a culture in which pilots who operated the CAPS system were celebrated – not criticised or even questioned – for their decision. This resulted in a steep drop in accident rates.

CIRRUS AIRCRAFT IS WELL KNOWN IN GENERAL AVIATION circles for its sleek designs and advanced avionics. But most of all, it is renowned for the innovative Cirrus Airframe Parachute System (CAPS), that has redefined the safety of small aircraft. According to the Cirrus Owners & Pilots Association (COPA), as of December 31, 2024, there have been 132 'saves' – or successful operations of the CAPS system – with 269 survivors.

But first a word about Cirrus Aircraft's flagship product. The Cirrus SR22 airframe is made almost entirely of composite materials, with fixed landing gear. It has a powerful Continental IO-550-N piston engine, rated at 310 total horsepower. Soon after the Cirrus SR22 entered service, it became the world's bestselling general aviation aircraft, setting a new standard of luxury, performance and advanced technology. It has an intuitive glass cockpit, equipped with the Cirrus Perspective+ by Garmin – a state-of-the-art avionics system that provides pilots with comprehensive flight data, navigation and communications. The spacious, well-appointed cabin includes seating for the pilot and four passengers. In July 2024, the Cirrus SR series crossed the 10,000 deliveries milestone.

The CAPS story dates back to 1982, when Ballistic Recovery Systems (BRS) began producing parachutes designed for ultralight aircraft. It took another ten years for BRS to develop a system capable of saving a Cessna type aircraft, and the device was marketed as an optional retrofit on the Cessna 150/152. Meanwhile, Cirrus founder brothers Alan and Dale Klapmeier conceived of such a system after Alan miraculously survived a mid-air collision in 1985 where the pilot in the other plane spiralled into the ground and was killed. In 1998, BRS collaborated with Cirrus to develop the first recovery parachute device to be used on a type certified aircraft: the Cirrus SR20. The system, christened CAPS, was certified by the Federal Aviation Administration in October 1998. It was quickly followed, in 2001, by a system for the Cirrus SR22, with CAPS then becoming standard equipment on all 10,000+ Cirrus SR aircraft. CAPS still is the only aircraft ballistic parachute used as standard equipment by an aviation company. Cirrus followed suit by equipping its Vision SF50, the world's first single-engine personal jet, with CAPS. The Vision Jet also has a Safe Return autoland system, which can be activated by passengers in an emergency, and safely land the aircraft automatically.

The 2,400 square foot CAPS parachute is stored in the aircraft's empennage. The automatic system is activated by pulling a red T-handle in the cockpit. A solid-fuel rocket then fires, extracting the chute far from the aircraft. Once the chute safely deploys in a controlled manner, it supports the aircraft's weight, ensuring a gentle descent with wings level, and ultimately lowering the plane safely on the ground or water. Unlike some other parachute recovery systems, deploying the parachute does not cause the aircraft to be written off. Depending on the degree of damage sustained on touchdown, Cirrus may repair the aircraft and put it back into service, as it has in many instances.

CAPS is most applicable to inexperienced pilots on solo flights in small aircraft whose engine suddenly quits. The "worst-case scenario" is when restarting attempts fail, and there are no airfields nearby. And that is when CAPS really proves its worth. Rather surprisingly, considering what a lifesaver the system can be, it initially received mixed reviews. Some veteran pilots felt it was a marketing gimmick that gave pilots a false sense of security and promoted risky behaviour. Indeed their opinion seemed to be borne out by a series of fatal accidents involving Cirrus SR22 planes. However, after carefully analysing accident case histories, Cirrus Aircraft and COPA set out to create a culture in which pilots who operated the CAPS system were celebrated – not criticised or even questioned – for their decision. This resulted in a steep drop in accident rates.

There have been several dramatic CAPS incidents involving Cirrus SR22 aircraft. In March 2023, shortly after takeoff from Pampulha Airport in Brazil, a Cirrus SR22 suffered engine failure. Realising there was insufficient glide range to return to the airport, the pilot deployed CAPS. His action resulted in the aircraft gently gliding, before safely touching down, and saved the lives of six people, including a three-year-old and a new-born. A year later, shortly after departure from Shelter Cove Airport, California, a Cirrus SR22 engine quit and the pilot activated CAPS. The plane landed among trees, and was suspended for a brief period, before tumbling to the ground inverted. The three occupants – two adults and a child – emerged with only minor injuries. These two incidents illustrate how ingenious and effective CAPS is as a safety feature. Indeed, it is not just for aviators. It gives passengers a viable option to save themselves, should the pilot ever be incapacitated and unable to land their plane. SP

— JOSEPH NORONHA

MILITARY

URUGUAYAN AIR FORCE BUYS FIVE EMBRAER A-29 SUPER TUCANO

Embraer announced that the Uruguayan Air Force (FAU) and the Uruguayan Ministry of National Defense (MDN) have converted options for five A-29 Super Tucano aircraft into firm orders. The agreement is part of a commitment signed in August 2024, when the FAU has announced a firm order for one aircraft plus the options that have now been converted. The agreement also includes mission equipment, integrated logistics services and a flight simulator. The contract is part of a fleet renew programme to expand FAU's operational capacity.

With Uruguay and the recent acquisition of the first A-29 in NATO configuration (A-29N) by Portugal, the A-29 Super Tucano reaches 20 operators worldwide, boasting over 290 orders. The number of air forces operating the A-29 Super Tucano steadily expands due to its unmatched combination of features, making it the most cost-effective, accessible, and versatile choice.

JAPAN SELECTS BEECHCRAFT TRAINING SYSTEM

Textron Aviation Defense announced in coordination with the Kanematsu Group that the Beechcraft T-6 Texan II Integrated Training System (ITS) has been chosen to modernise pilot training for the Japan Air Self-Defense Force (JASDF). Japan will join 14 other nations that have selected the T-6 Texan II, adding to a fleet of more than 1,000 T-6 aircraft delivered worldwide.

The JASDF is modernising its training programme with an integrated solution featuring T-6 Texan II trainer aircraft, a comprehensive Ground Based Training System, training for instructor pilots and aircraft maintainers and long-term logistic and sustainment support. The Beechcraft T-6 Texan II will replace the Fuji/Subaru T-7 aircraft that has been the JASDF's basic trainer for many years. The T-6 Texan II was selected after a highly competitive and thorough evaluation of training solutions offered by several bidders. Finalisation of the contract is expected in 2025.

GE AEROSPACE ANNOUNCES NEXT ENGINEERS EXPANSION

THE GE AEROSPACE FOUNDATION announced the expansion of its Next Engineers college readiness programme to Bengaluru, India, to advance the programme's goal of encouraging young people to pursue careers in engineering.

The expansion of Next Engineers will help build a strong engineering pipeline in India. With this announcement, the GE Aerospace Foundation, alongside leadership and volunteers at the Bengaluru facility, will now move forward with identifying an academic partner to be announced in late 2025.

Bengaluru was selected using a range of criteria, including GE Aerospace's employee footprint, the strength of GE Aerospace's manufacturing and engineering presence, and anticipated engagement in the programme. GE Aerospace in India supports the entire lifecycle of the company's engines and products. It has a strong history of volunteering in the local community, including STEM education.

In 2024, the GE Aerospace Foundation committed $20 million through 2030 to expand Next Engineers. This commitment will help bridge the gap for students in middle school to college who are interested in engineering careers. The Next Engineers program currently serves students in Cincinnati, Ohio, Greenville, South Carolina in the United States, Johannesburg (South Africa), Staffordshire (United Kingdom), and Warsaw (Poland), reflecting the global reach and impact that GE Aerospace has in communities around the world. SP

TEXTRON AVIATION SECURES FIRST INTERNATIONAL SALE

Textron Aviation announced the first international sale of seven of its Beechcraft King Air 260 military multi-engine training aircraft. SkyAlyne and KF Aerospace selected the King Air 260 in support of the Future Aircrew Training (FAcT) programme to train pilots for the Royal Canadian Air Force (RCAF). The FAcT programme was awarded to SkyAlyne, a joint venture between CAE and KF Aerospace. King Air 260 deliveries for the FAcT programme are expected to begin in the first half of 2028.

FAcT specific capabilities include factory options for a Night Vision Goggle (NVG) compatible cockpit, TACAN (Air-to-Air), Angle of Attack (AOA), V/UHF radio, digital audio system, engine trend monitoring, condition-based maintenance plus, observer/jump seat, passenger mission seats and full-face oxygen masks. The versatile and reliable Beechcraft King Air 260 will replace the fleet of Beechcraft King Air C-90B aircraft that has proudly served the RCAF for decades. The King Air 260 training aircraft will be delivered in a fully compliant, FAcT mission-ready configuration from Textron Aviation's King Air production line.

BOMBARDIER'S NEW HEAD OF STATE MULTI-MISSION GLOBAL 7500 AIRCRAFT

Bombardier Defense celebrated the first public unveiling of armasuisse's newly-delivered Global 7500 multi-mission aircraft. The platform will be equipped for government and military personnel transport and for emergency evacuation missions. The addition of this next-generation platform to armasuisse's fleet will ensure an increased transportation capacity and protection for government and military officials, and an efficient platform to perform critical humanitarian missions. Bombardier Defense delivered the Global

BOEING'S COMMERCIAL MARKET OUTLOOK – INDIA AND SOUTH ASIA AIRPLANE FLEET TO QUADRUPLE BY 2043

Demand for 2,835 new airplanes over 20 years propelled by Indian carriers

BOEING FORECASTS INDIA AND SOUTH Asia's commercial airplane fleet will grow nearly four-fold over the next 20 years, building on sustained fleet growth throughout the last decade. Continued growth will be fueled by greater demand and a rise in the region's air traffic, which will grow more than seven per cent annually through 2043 driven by sustained economic growth, improved connectivity and policies that support air travel liberalisation, according to Boeing's current Commercial Market Outlook (CMO).

Domestic air traffic is expected to remain the largest and fastest-growing segment in India's travel market, according to the CMO. This projected traffic growth will be enabled by further low-cost carrier expansion and network diversification as airlines offer more routes and destinations throughout the region. Fuel-efficient single-aisle airplanes, such as the 737 MAX, will account for nearly nine out of 10 commercial jet deliveries in the forecast period, providing airlines with greater network flexibility and better economics on fast-growing short- and medium-haul routes. The region's widebody fleet will quadruple as carriers leverage airplanes like the 787 Dreamliner and 777X to further develop long-haul networks, particularly from India to North America, where capacity has doubled in the past decade.

Commercial Airplane Deliveries to India and South Asia (2024-2043)	
Regional Jet	<10
Single Aisle	2,445
Widebody	370
Freighter	20
Total	2,835

"The India and South Asia region continues to be the world's fastest-growing commercial aviation market due to strong economic and trade growth, rising household incomes and investments in infrastructure and development," said Ashwin Naidu, Boeing Managing Director of Commercial Marketing for India and South Asia. "As our CMO shows, people will have greater access to air travel, and the region's airlines will require a modern fuel-efficient fleet to meet increased demand over the next two decades."

The CMO also forecasts India and South Asia's cargo freighter fleet, including new and converted models, will grow five-fold as the region expands its role in global supply chains, advanced manufacturing and e-commerce. Demand for pilots, cabin crew and technicians will quadruple to 1,29,000 along with commercial airplane fleet expansion representing the fastest growth rate of any region globally. SP

7500 aircraft to armasuisse in December 2024, and the first deployment by the Federal Air Transport Service is set for early 2025.

On top of providing exceptional aircraft, Bombardier Defense has dedicated in-house engineering and support teams available 24/7 worldwide. Bombardier Defense's teams also have the ability to incorporate modifications tailored to the customers' needs with complete certification capabilities across the full spectrum of civilian, military and hybrid operations.

BAYKAR SET TO BECOME THE NEW OWNER OF PIAGGIO AEROSPACE

Italy's Ministry of Enterprises and Made in Italy has approved the sale of Piaggio Aerospace, the country's aviation giant, to Baykar. The world's largest UCAV company, Baykar outbidded rivals from multiple countries in a competitive tender for the sale of Piaggio Aerospace, which was established in 1884.

Piaggio Aerospace is best known in the aviation industry for producing P.180 Avanti business jets and aircraft engines. The company also plays a strategic role in Italy's defence industry ecosystem thanks to its maintenance, repair, and overhaul (MRO) services, and is renowned for its contributions to Italy's technological infrastructure over its 140-year history.

With this acquisition, Baykar is set to expand its influence in the European aviation market while preserving Piaggio's historical legacy and enhancing its production capacity. This strategic move adds to the global successes of Türkiye's aviation industry and ensures that Piaggio's historical identity is carried into the future through this agreement.

PHOTOGRAPHS: BOEING


WHAT WILL DEFINE THE FUTURE OF AEROSPACE AND DEFENSE?
Electrification. Advanced, secure networking. Next generation materials. Hypersonic flight. Artificial intelligence and machine learning. High-energy lasers. Autonomous, smart sensors. Sixth generation engine technologies. These are just some of the ways we're transforming how we connect and protect our world. Finding answers to the biggest questions is what defines us.
Learn More at RTX.com
RTX
COLLINS AEROSPACE | PRATT & WHITNEY | RAYTHEON