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SP's Aviation

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FEBRUARY • 2011

Aero India 2011 SPECIAL

INDIA A HUGE MARKET

Inside

- Defence Procurement Procedure 2011
- Military Market
- Civil Market
- Expert Opinion and Analysis

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24 The first of the six C-130J Super Hercules for India left the Lockheed Martin facility in Marietta on its ferry flight early this month. An induction ceremony was held at Hindon Air Base on February 5, 2011.

In this issue

INDIA A HUGE MARKET

The world is focusing its attention on India. The markets are here and no global company can afford to ignore it.

Cover Image:
A graphic representation showing the fast growing aircraft market in India
Image by Fotolia

NEXT ISSUE:
Next Generation Fighters

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A Word *from* Editor

The synergies are falling in place, the momentum is there, the market is attractive, the mindsets are changing and India is on the threshold of taking centre stage

THE ARC LIGHTS ARE on the premier aerospace event in the region — Aero India International Air Show 2011 — happening in Bengaluru from February 9 to 13. Global majors in the defence and aerospace sectors; industry leaders; defence officials and others will be in the "aerospace city", all in the bid to enhance defence capabilities and further business opportunities.

For us at SP Guide Publications, as the official media partner of Aero India 2011, it indeed is a matter of pride to be associated with the event as we strongly believe in 'India Emerging'.

In this Special Edition, *SP's Aviation* is focused on the humongous opportunities in combat aircraft, trainers, armaments, force-multipliers, business aviation, airlines, etc. The figures cast are mind-boggling — combat aircraft alone has prospects of nearly $80 billion (₹3,60,000 crore) in about a decade's time. The race for the huge pie is hotting up, not just within the country but from the original equipment manufacturers (OEMs) who are landing here in droves. The UK delegation is being led by the Minister for Defence Equipment Support and Technology, Peter Luff, who has affirmed that UK companies "are intent on forging long-lasting industrial partnerships and joint ventures with Indian companies."

With regard to India's defence capabilities, there is no gainsaying the fact that it urgently needs to be modernised and putting this in perspective is the former Chief of the Air Staff Air Chief Marshal, S. Krishnaswamy, while the outgoing Deputy Chief of Air Staff, Air Marshal N.V. Tyagi has talked about the Indian Air Force transforming itself from a tactical air force to an aerospace force with strategic capabilities. And there cannot be a more apt statement: "The more you train in peace, the less you bleed in war" by the Air Officer Commanding-in-Chief, Training Command, Air Marshal Dhiraj Kukreja who has delved into the training aspects of the air warriors.

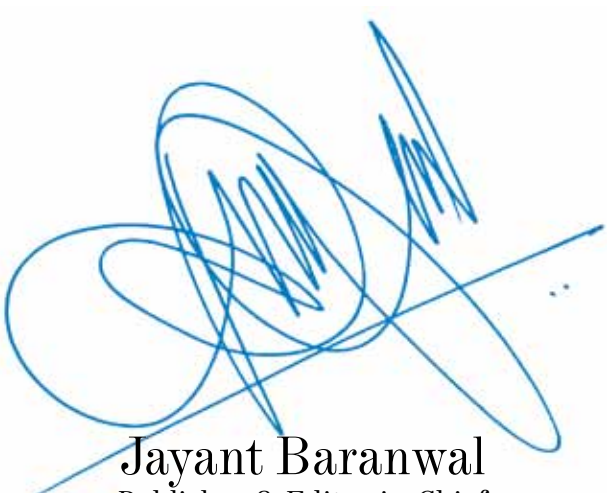
The Indian Government understands the urgency as can be seen from the investments being made in the defence sector and also the policies being adopted—the latest being the Defence Procurement Procedure 2011 and the Defence Production Policy, both of which have been liberalised to give boost to indigenisation, encourage the private sector and become self-reliant, moving away from defence equipment imports which is at a disturbingly high 70 per cent.

This has been acknowledged by the industry and the Chairman of the Indian aerospace behemoth the Hindustan Aeronautics Limited, Ashok Nayak in an exclusive interview. He has indicated that while HAL has begun the restructuring process to cater to the future, it is looking at increased partnership with the private players.

In sync, the civil aviation market too is in a thermal, attaining new records in passenger, freight and aircraft movements. With India Inc. prospering and the billionaire list growing, the business jet segment has all the reasons to cheer.

The synergies are falling in place, the momentum is there, the market is attractive, the mindsets are changing and India is on the threshold of taking centre stage.

Aero India is a window of opportunity and *SP's Aviation* team wishes all participants a rewarding time at the show!



Jayant Baranwal
Publisher & Editor-in-Chief

ARTIST'S CONCEPT OF AN AIRCRAFT FROM BOEING THAT COULD ENTER SERVICE IN 2025

Aircraft of 2025

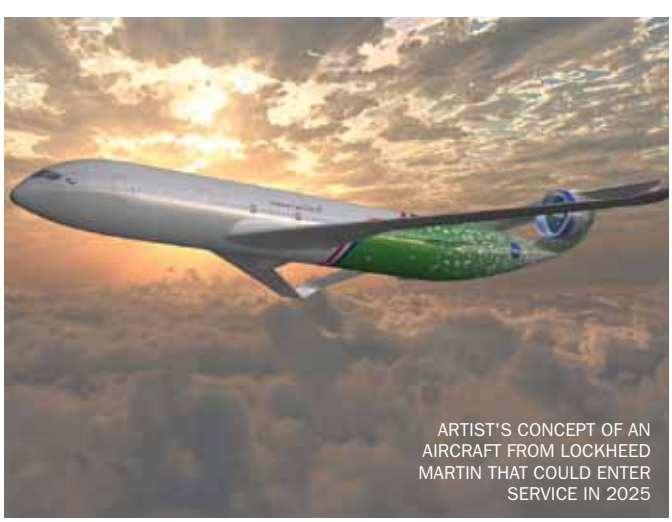
NASA awards contract to Lockheed Martin, Northrop Grumman and Boeing to study advanced design concepts for aircraft

LOCKHEED MARTIN, NORTHROP GRUMMAN and the Boeing Company have been awarded contract by the National Aeronautics and Space Administration (NASA) to study advanced concept designs for aircraft that could take to the skies in the year 2025. At the time of the award of the contract late 2010, teams from the companies gave NASA a sneak peek of the particular design they plan to pursue.

Although each design looks different, all final designs have to meet NASA's goals for less noise, cleaner exhaust and lower fuel consumption. Each aircraft should be able to do all of those things at the same time, which requires a complex dance of tradeoffs between all of the new advanced technologies that will be on these vehicles. The proposed aircraft will also have to operate safely in a more modernised air traffic management system. And each design has to fly up to 85 per cent of the speed of sound; cover a range of approximately 7,000 miles; and carry between 50,000 and 100,000 pounds of payload, either passengers or cargo.

Each team will be exploring, testing, simulating, keeping and discarding innovations and technologies to make their design a winner. SP

—SP's Aviation News Desk



ARTIST'S CONCEPT OF AN AIRCRAFT FROM LOCKHEED MARTIN THAT COULD ENTER SERVICE IN 2025

PHOTOGRAPHS: NASA / BOEING & LOCKHEED MARTIN

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PHOTOGRAPH: USAF

6 Generation Fighter

US defence officials are exploring new fighter technology ideas based around a new combat aircraft to take over from the F-22 Raptor

The Raptor—a fifth-generation fighter—has only been in service for a few years, but already the United States Air Force (USAF) has expressed interest in designs for a sixth-generation aircraft with an initial service entry date of 2030. Contrary to earlier expectations, the requirement is for a manned aircraft, not a strike UAV or similar.

The USAF's sixth-generation fighter needs were laid out in a document issued by the Air Force Material Command on November 3, 2010.

The USAF stressed that the Next Generation Tactical Aircraft (Next Gen TACAIR) Material and Technology Concept Search document is a 'capability request for information', to which all firms could respond.

The features specified in the USAF's next generation fighter aircraft document included a high-tech air defence system able to counter airborne threats; a directed-energy weapons (DEW) capability (directed energy weapons attack by releasing energy on chosen targets) and an aircraft optimised to work as a missile defence, close air support and air interdiction roles. Among its other desired characteristics—expressed by key terms such as survivability, longer range and endurance—the new aircraft could also incorporate high-level, low-observable stealth technologies and be able to operate at a range of speeds up to and beyond Mach 2.

This next gen USAF technology news has been received positively in many quarters—since no new US combat aircraft designs are being developed at present—and Armed Forces International will present further coverage of Next Gen TACAIR in a future news item.

The F-22 Raptor formally joined the USAF at the end of 2005 and as of September 2010, 166 had been delivered, out of an ultimate fleet of 187. Current restrictions mean that the type will only serve the USAF, although other countries including Japan have expressed keenness in acquiring it.

The F-22 features a high level of stealth and can also super-cruise. In other words, it means hit and maintain speeds above Mach 1 without the use of afterburners. SP

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CHINESE FIFTH GENERATION FIGHTER UNVEILED

China's new fighter plane has been unveiled. Photographs of a new fighter aircraft that have appeared on Chinese websites recently are creating a buzz in military circles as they are the first indication that Beijing is close to getting an indigenous fifth generation fighter, barely a year after the first flight of the Russian T-50 PAK-FA. While there is no official communication from the Chinese Government, the clearer images that are now available on the net have led experts to concede that the aircraft seems to be real. While it could still be part of an elaborate hoax, this is not the first time that there has been a limited release of photographs that reveal a new Chinese military system.

VIEWS

THE FIRST INDICATIONS THAT China was embarked on the development of a fifth generation combat aircraft (FGCA) with "stealth" characteristics came in 2009 in a Chinese media interaction with a senior military functionary of the People's Liberation Army Air Force (PLAAF) where it was revealed that the new fighter aircraft was scheduled for its maiden flight in 2010-11 and would enter service with the PLAAF by 2019. It was around Christmas time in 2010 that pictures of the new aircraft undergoing ground handling trials at the Chengdu airfield appeared on Chinese websites. With a canard delta wing plan-form and possessing distinctly stealth features, the aircraft designated as the J-20, has a striking resemblance to both the Russian T-50 PAK-FA and the US F-22 Raptor. Expected to enter the flight test phase in the next one year or so, the J-20 is a single-seat, twin engine aircraft, approximately 75 feet in length and is estimated to have a maximum takeoff weight of around 36 tonnes.

Since the 1950s, China has been producing military aircraft of Russian design either under licence or by cloning to impart Chinese identity and a semblance of originality. The J-10, perhaps the only exception, is believed to be based on the Lavi design acquired from Israel after the project there was cancelled. However, in the production of military aircraft of Russian origin, the Chinese aerospace industry has been trailing both in quality to varying degrees and in timeframe by a decade or more. But the experience gained in the production of modern combat aircraft such as the J-11, copy of Su-27, the J-11 BS, said to be a copy of the Su-30 MKK and the carrier-based fighter J-15, copy of the Su-33, has provided the Chinese aerospace industry a breakthrough into contemporary aerospace technologies and perhaps the confidence to attempt a quantum leap in the development of aircraft of the next generation.

Aspirations notwithstanding, the Chinese aerospace industry is afflicted by notable inadequacies in a number of areas. China has not been able to successfully reproduce the renowned and highly efficient Russian AL-31F engine that has been in use for the last nearly three decades. The less efficient Chinese version of the AL-31F, the WS-10, powers a number of Chinese-made fighter aircraft. Timeframe for the development of the improved version WS-15 is yet uncertain. Besides, China is not known to produce the quality or quantity of composite materials required in the construction of the airframe of modern stealth aircraft in significant numbers. Although improving steadily, China still lags behind in avionics and aerial weapons in respect of sophistication as compared with Russia or the West. China, therefore, will have no option but to continue to lean heavily on Russia in the J-20 programme as has been the pattern since the 1950s.

The technological challenges before the Chinese aerospace industry in its efforts to design and develop the next generation combat machine can indeed be daunting. The J-20, coming 20 years behind the F-22 Raptor, is an entirely new aircraft being developed almost in parallel with the Russian T-50 PAK-FA and has the potential of being a game changer in the region of strategic concerns for the US and her allies. With a strong national focus, sense of purpose and discipline, despite the shortcomings of the aerospace industry, there should be little doubt regarding China's ability to drive the J-20 project to successful completion in not too distant a future. The qualitative change in China's air power expected in the future and the potential for sustained collaboration with Pakistan, will throw up new challenges for the security of the region and especially for India. Therefore, the Chinese move ought to inject a sense of urgency in the otherwise excruciatingly tardy pace witnessed so far in the effort at enhancement of the combat potential of the Indian Air Force. SP

—Air Marshal (Retd) B.K. Pandey

ILLUSTRATION: ANOOP KAMATH

Industry Friendly OFFSET

The latest revised DPP-2011 incorporates further refinements, based on the experience of procurement agencies and feedback from the defence industry, both domestic and abroad. The most vital changes relate to the offset policy guidelines which are bound to be wholeheartedly welcomed by the industry.

PHOTOGRAPH: PIB

IN YET ANOTHER BUT vital revision of India's policy on the Defence Procurement Procedure (DPP), Defence Minister A.K. Antony signed the DPP-2011' on December 27, effective since January 1. The same was formally released on January 13. In his foreword, Antony reiterated that defence acquisition is a complex decision-making process that needs to balance the competing requirements of expeditious procurement, development of an indigenous defence industry, and conformity to the highest standards of transparency, probity and public accountability. In trying to maintain an optimum balance of the three, more often than not conflicting requirements, the DPP has been put through the mill of continuous reviews to address adequately the apprehensions as well as aspirations of all concerned. Little wonder then that the Defence Procurement Procedure first introduced in 2002 has gone through as many as six 'upgrades' to reach the present state.

The latest revised DPP-2011 incorporates further refinements, based on the experience of procurement agencies and feedback from the defence industry, both domestic and from abroad. The most vital changes relate to the offset policy guidelines which are bound to be wholeheartedly welcomed by the industry. The scope of offsets in DPP-2011 makes a departure from the earlier restriction of it being connected to the defence only. The new DPP includes, in addition, civil aerospace, internal security and training within the ambit of eligible products and services also for the discharge of offset obligations (for details see Annexure VI to Appendix D of the document DPP-2011 and Forum).

Other major difference which has been brought about is with regard to the 'acceptance of necessity'—the very first step after the issuance of services qualitative requirements (SQRs) by the respective Service Headquarters and the second in the long chain of the defence procurement procedure—which is bound to bring cheer to all the participants i.e. industry, the user, as well as the Ministry of Defence (MoD). A caveat has been added in Para 20, Chapter I for 'Buy' and 'Buy and Make' categories which reads thus, "For cases where the original RFP has been issued within two years from accord of acceptance of necessity (AON) and later retracted for any reason, the AON would continue to remain valid, so long as the original decision and categorisation remain unchanged, provided the subsequent request for proposal (RFP) is issued within one year from the date of retraction of original RFP." This vital addition appears to have been included in the original para as part of a learning curve which the decision-makers must have encountered while tackling the stalled proceedings in the case of the Army's procurement of 197 light utility helicopters (LUH). It may be recalled that the acquisition process in this case had been stopped midstream when some technical irregularities were brought to light immediately after the field evaluation trials had been completed. This had led to the cancellation of the entire acquisition process with directions emanating from the Defence Ministry for the issuance of a new RFP. Under normal circumstances, issuing de novo the RFP would have almost certainly been affected by the two-year clause from AON to RFP resulting in prolonged and debilitating delays. It is well known now as to how the new clause has helped in issuing a new RFP without having to go through the lengthy exercise of obtaining the AON once again. The new RFP was also enlarged to include the requirements of the IAF swelling greatly the numbers of helicopters. The latest reports suggest not only the completion of field trials post the issuance of the new RFP but also that two helicopters i.e. Eurocopter Fennec AS555 and Kamov 226A Segei may have already been shortlisted for progressing further the acquisition process. It is clear that such quick recovery from the earlier cancelled RFP would not have been possible without the provision of the new clause. As a matter of fact, the case might have provided the necessary catalyst for its inclusion in the DPP-2011.

But does that mean the DPP in its latest avatar reached the acme of perfection? In the 'foreword' while hoping for expeditious decision-making and simplification of contractual and financial provisions, the Defence Minister candidly accepts the necessity of further improvements based on experience and feedback. So, is there room for further refinement of the DPP? Read Forum for the changes in offset obligations in detail along with a few suggestions. SP

—Air Marshal (Retd) V.K. Bhatia


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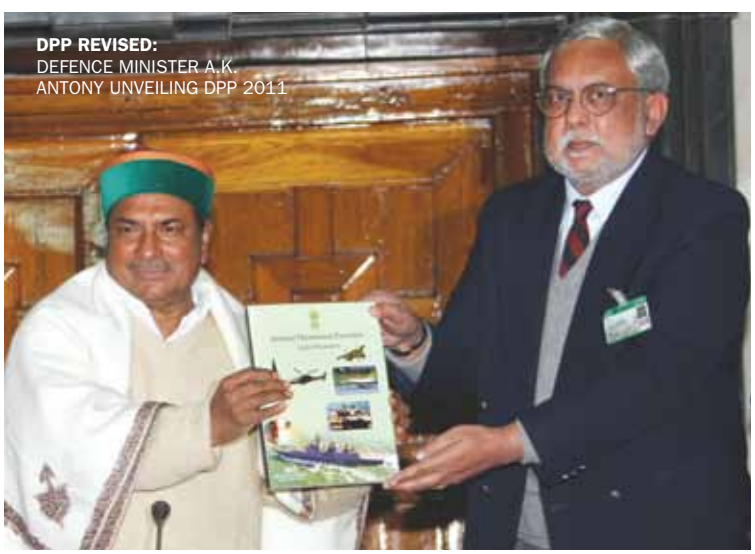
RESULTS AWAITED

It has taken a full decade for DPP to be shaped into the present state of refinement. How long it would take to start showing results on the ground could be anybody's guess.

THE NEW DPP-2011 HAS incorporated a few much needed refinements which make it more convenient, at least in terms of meeting the offset obligations by the prospective foreign vendors, for the sale of defence equipment to the Indian armed forces. This was made possible by adding the civil aerospace and internal security sectors to the defence in the list of products eligible for the discharge of offset obligations.

But how did it all start? In 2001 (post-Kargil operations), a Group of Ministers (GoM) was constituted to reform the National Security System. Apart from other recommendations, they reviewed the defence procurement procedures and recommended the setting up of a new Defence Procurement Management Structure and Systems. Accordingly, these structures and systems were set up at the Ministry of Defence (MoD) the same year and in order to operationalise them, the procedure for defence procurement of 1992 vintage was revised. The Defence Procurement Procedure 2002 (DPP 2002) came into effect in December 2002. It was applicable to procurements flowing out of the 'Buy' decision of Defence Acquisition Council (DAC). The scope of this procedure was enlarged in June 2003 to include procurements flowing out of 'Buy and Make' decisions. The procedure was further reviewed in DPP-2005 which came into effect from July 1, 2005. The DPP-2005 was also reviewed and revised based on the experience gained in its implementation and further enlarged to include a revised 'fast track procedure' and 'procedure for indigenous warship building'. It also included procurements categorised in the 'Make' category for bridging the critical gap and provided requisite framework for increased participation of Indian industry in the defence sector. This brought in DPP-2006 which came into effect from September 1, 2006. At this stage, it was decided that review of the procurement procedure would be undertaken every two years. This led to the issuance of DPP-2008 which was further revised in late 2010 and officially released on January 13 this year as DPP-2011.

> The new DPP-2011 has incorporated a few much needed refinements which make it more convenient, at least in terms of meeting the offset obligations by the prospective foreign vendors, for the sale of defence equipment to the Indian armed forces



DPP REVISED: DEFENCE MINISTER A.K. ANTONY UNVEILING DPP 2011

In addition to the improvements brought out in the In Focus column, another major refinement has been the inclusion 'Buy and Make (Indian)' procedures in DPP-2011. In cases initiated under this category, RFP will be issued to only Indian vendors, who are assessed to have requisite technical and financial capabilities to undertake such projects. For selection of such cases, the concerned Service HQ (SHQ) will be asked to prepare a Capability Definition Document outlining the requirement in operational terms indicating present capabilities determined on the basis of existing equipment and the future requirements in terms of numbers, time-schedule, fund availability and the critical technologies to be absorbed

PHOTOGRAPH: PIB

LIST OF PRODUCTS ELIGIBLE FOR DISCHARGE OF OFFSET OBLIGATIONS

Defence Products

- Small arms, mortars, cannons, guns, howitzers, anti-tank weapons and their ammunition including fuse.
- Bombs, torpedoes, rockets, missiles, other explosive devices and charges, related equipment and accessories specially designed for military use, equipment specially designed for handling, control, operations, jamming and detection.
- Energetic materials explosives, propellants and pyrotechnics.
- Tracked and wheeled armoured vehicles, vehicles with ballistic protection designed for military applications, armoured or protective equipment.
- Vessels of war, special naval systems, equipment and accessories.
- Aircraft, unmanned airborne vehicles, aero engines and aircraft equipment, related equipment specially designed or modified for military use, parachutes and related equipment.
- Electronics and communications equipment specially designed for military use such as electronic countermeasure and countermeasure equipment surveillance and monitoring, data processing and signalling, guidance and navigations equipment, imaging equipment and night vision devices, sensors.
- Specialised equipment for military training or for simulating military scenarios, specially designed simulators for use of armaments and trainers.
- Forgings, casting and other unfinished products which are specially designed for products for military applications and troop comfort equipment.
- Miscellaneous equipment and materials designed for military applications, specially designed environmental test facilities and equipment for the certification, qualification, testing or production of the above products.
- Software specially designed or modified for the development, production or use of above items, this includes software specially designed for modelling, simulation or evaluation of military weapons systems, modelling or simulations military operation scenarios and command, communications, control, computer and intelligence (C4I) applications.
- High velocity kinetic energy weapons systems and related equipment.
- Direct energy weapons systems, related or countermeasures equipment, super conductive equipment and specially designed for components and accessories.

Products for Internal Security

- Arms and their ammunition including all types of close quarter weapons.
- Protective equipment for security personnel including body armour and helmets.
- Vehicles for internal security purposes including armoured vehicles, bullets proof vehicles and mine protected vehicles.
- Riot control equipment and protective as well as riot control vehicles.
- Specialised equipment for surveillance including hand-held devices and unmanned aerial vehicles.
- Equipment and devices for night fighting capability including night vision devices.
- Navigational and communications equipment including for secure communications.
- Specialised counter-terrorism equipment and gear, assault platforms, detection devices, breaching gear, etc.
- Training aids including simulators and simulation equipment.

Civil Aerospace Products

- All types of fixed wing as well as rotary aircraft including their airframes, aero engines, aircraft components and avionics.
- Aircraft design and engineering services.
- Technical publications.
- Raw material and semi-finished goods. •

by the Indian partner. The Capability Definition Document after examination by the Services Capital Acquisition Plan Categorisation Higher Committee (SCAPCHC) will be approved by the Defence Acquisition Council. The document would be floated to the concerned Indian firms to give Detailed Project Proposal (DPP – not to be confused with the Defence Procurement Procedure) outlining the roadmap for development and production of the item either by themselves or with the help of any production arrangement with foreign manufacturer.

After due processing at different levels of the MoD, (not possible to reproduce in detail here due to space constraints) the selected firm could be tasked to develop and manufacture the equipment. The crux of the whole thing rivets around creating capabilities to develop and produce state-of-the-art defence equipment within the country through indigenous effort with or without foreign participations. The changes in DPP-2011 should be viewed in context with the 'first-ever announced' Defence Production Policy which aims at achieving substantive self-reliance in design, development and production of defence equipment, weapon systems and platforms. Released on the same day as the DPP-2011, under the new production policy, preference will be given to indigenous design, development and manufacture of defence equipment whenever there is a possibility of these being made by the Indian industry within the timelines required by the Services. While examining the procurement cases, the time taken in the procurement and delivery from foreign sources vis-à-vis the time required for making it in the country, along with the criticality and urgency of the requirement will be taken into account before deciding to proceed with procurement from foreign sources. According to Antony, to synergise and enhance the national competence in producing state-of-the-art defence products all viable approaches such as formation of consortia, joint venture and public-private partnerships, etc within the government approved framework will be undertaken.

Further, the government has gone to the extent of declaring that policies will be put in place to encourage all public and private players to strengthen their research and development wings for which it would set up a separate fund to provide necessary resources. It appears, at least outwardly, that the government is serious about creating self-reliance in building defence equipment, but the big question would always remain as to how and in what timeframe these policies would be implemented. There has been always a vast gulf of inaction between intention and implementation where the Indian politico-bureaucratic combine is concerned and nobody seems to be worried about the endless delays in decision-making which have brought the services to a sorry state of neglect and obsolescence. Take the case of the DPP itself where it has taken a full decade for it to be shaped into the present state of refinement. How long it would take to start showing results on the ground could be anybody's guess.

In the final analysis, while some of the major improvements incorporated in the latest DPP point towards the possibilities of successful outcomes of the ongoing programmes such as the medium multi-role combat aircraft (MMRCA) project due to enlarging of the scope of offsets, it would only be possible if the decision-making processes are also time-sensitive to keep pace with the modernisation needs of the services—immaterial whether the route is 'Buy', 'Buy and Make' or 'Make'. SP

—Air Marshal (Retd) V.K. Bhatia, New Delhi

Quote Unquote

"THE SUCCESSFUL COMPLETION OF THESE (MILITARY AVIATION) PROGRAMMES WILL LEAD THE COUNTRY TOWARDS SELF RELIANCE WITH THE STATE-OF-THE-ART TECHNOLOGIES IN THE WORLD. THE TIME HAS NOW COME FOR OUR INDUSTRIES BOTH PUBLIC AND PRIVATE SECTOR, TO MANUFACTURE THESE WORLD CLASS MILITARY SYSTEMS WITH HIGHEST QUALITY AND PRODUCTIVITY."

— DEFENCE MINISTER A.K. ANTONY AT THE TEJAS INITIAL OPERATIONAL CLEARANCE (IOC) PROGRAMME

"IT (TEJAS) IS NOT YET A FOURTH-GENERATION FIGHTER. IT'S STILL A MIG 21++….."

—CHIEF OF THE AIR STAFF AIR CHIEF MARSHAL P.V. NAIK AT THE TEJAS INITIAL OPERATIONAL CLEARANCE (IOC) PROGRAMME

"CAPACITY EXPANSION WILL NOT HAPPEN OVERNIGHT. THE EXISTING INFRASTRUCTURE WILL NOT SUFFICE FOR THE NEW INDUCTIONS INCLUDING MMRCA. WE HAVE TO BUILD INFRASTRUCTURE NOW FOR WHICH WE NEED MASSIVE INVESTMENTS AND WE ARE WORKING IN THAT DIRECTION."

—HAL CHAIRMAN ASHOK NAYAK IN AN INTERVIEW WITH SP'S AVIATION

"THE COUNTRY NEEDS A GOOD SPACE PROGRAMME WHICH IS IMAGINATIVE, SPECIAL AND THAT TAKES CARE OF ALL OUR DEFENCE NEEDS. I DON'T TRUST ANYBODY. WE HAVE LEARNT OUR LESSONS AND SO WE NEED TO DEFEND OURSELVES."

—FORMER CHIEF OF THE AIR STAFF AIR CHIEF MARSHAL S. KRISHNASWAMY ADDRESSING A CONFERENCE ON 'SPACE, SCIENCE AND SECURITY: THE ROLE OF REGIONAL EXPERT DISCUSSION'

"THE RECOVERY CYCLE WILL PAUSE IN 2011. ALTHOUGH THE $9.1 BILLION PROFIT PROJECTION FOR 2011 IS BETTER THAN WE HAD PREVIOUSLY FORECAST, NEXT YEAR THE AVIATION INDUSTRY WILL FACE TOUGHER CONDITIONS THAN WHAT WE ARE EXPERIENCING TODAY."

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IAF is in the process of **transforming** from a tactical air force to an **aerospace force** with strategic capability

The outgoing Deputy Chief of Air Staff Air Marshal N.V. Tyagi speaks about the status of MMRCA deal and various other key programmes to Air Marshal (Retd) V.K. Bhatia of *SP's Aviation*

SP's Aviation (SP's): What are the various steps being undertaken towards modernising the IAF for it to become a well-balanced, strategic and a continental air force in the true sense in terms of combat power, support systems and infrastructure?
Air Marshal N.V. Tyagi (DCAS): The IAF currently has embarked on a modernisation programme and is transforming itself into a potent strategic force. The IAF envisions itself to be a modern force capable of taking on multi-front and multi-dimensional threats in the future. With the changing global environment, the IAF will continue to evolve, keeping pace with advancement in technology and perceived challenges to our national security. Rapid pace in technological advances will continue to change the concept of employment of aerospace power. Hence, the IAF doctrine will also continue to evolve so as to derive maximum advantage offered by new technologies.

The focus is on the modernisation plan to enhance our potential across the entire spectrum of operations. Towards this, we are in the process of transforming ourselves from a tactical air force to an aerospace force with strategic capability to meet any challenge to our national security. The induction of airborne warning and control system (AWACS) and air-to-air refuellers has increased the range and reach of the IAF. We are in the process of inducting very heavy lift transport aircraft which would provide us adequate strategic reach to address our future security concerns.

The modernisation programme of IAF is well on its way and we are progressing procurement of medium multi-role combat aircraft (MMRCA), fifth generation fighter aircraft (FGFA), C-17, additional C-130-J, heavy lift helicopter (HLH), medium light helicopter (MLH), attack helicopters, radars including low level light weight radars (LLLWR), mountain radars and air defence (AD) weapon systems. In addition, mid-life upgrades of Jaguar, Mirage 2000 and MiG-29 will ensure combat relevance of these weapon platforms. The upgradation of Su-30 and integration of BrahMos avionics software support cost model (ASSCM) will further enhance the potential and lethality of our Su-30 fleet. Modernisation of air field infrastructure (MAFI) is also being undertaken in a phased manner to support operations. The modernisation of IAF is progressing well with adequate budgetary support from the government.

SP's: The IAF has suffered a sizeable downslide in the numerical strength of its combat squadrons. How has it affected the IAF's combat power and what is being done to not only arrest any further decline but rebuild the force?
DCAS: The present strength of combat squadrons stands at 35. With progressive induction of Su-30MKIs, MMRCAs, light combat aircraft (LCA) and the FGFA, we plan to have 42 operational fighter squadrons by the end of the Thirteenth Five Year Plan, up from the existing 35.

SP's: How is the IAF dealing with the requirement of mid-life upgrade programmes of its existing fleet/systems?
DCAS: The mid-life upgrade programmes for Su-30MKI, Mirage 2000, MiG-29 and Jaguar aircraft are under way as per plan. Major systems being upgraded are mission computers, weapon control systems, cockpit layout, instrumentation, display systems, incorporation of new weapon systems,

PHOTOGRAPHS: IAF, SUKHOI & ANOOP KAMATH

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navigation and flight data recording systems and active electronically scanned array (AESA) radar.

SP's: How is the MMRCA project progressing and when can the IAF expect the first induction into squadron service? What is likely to be the final size of the MMRCA fleet?
DCAS: The MMRCA staff evaluation report is under the process of acceptance by the Ministry of Defence (MoD). The technical offset evaluation is concurrently under progress. On completion, the case will be progressed to TOC and CNC. Induction into service is planned during the Twelfth Five Year Plan. The present plan is to induct 126 aircraft only.

SP's: Could you give details of the Indo-Russian joint FGFA programme? What would be DRDO's participation in the development programme and how would the Indian variant be different from its Russian counterpart?
DCAS: FGFA is being jointly developed by India and Russia to meet the operational requirements of both the countries in future. We envisage induction of a total of 250-300 of these aircraft. It would be able to super-cruise and have long-range capability. The Indian version of FGFA will be able to carry more weapons than the Russian version due to our specific requirements. We also plan to induct some twin-seat versions.

FUTURE PERFECT: (TOP) THE INDIAN VERSION OF FGFA WILL CARRY MORE WEAPONS THAN THE RUSSIAN COUNTERPART; THE LCA IS EXPECTED TO REPLACE THE MIG-21 AIRCRAFT (ABOVE)

SP's: India has entered into collaboration with Russia to jointly develop and produce the multi-role transport aircraft (MTA). Could you give details of the programme? How many aircraft are likely to be inducted into IAF and do you foresee any export possibilities of the end product?
DCAS: The contract to jointly develop MTA was signed between the Hindustan Aeronautics Limited (HAL) and Russia UAC of Rosoboronexport, Russia in September 2010. Thereafter, a joint venture (JV) company has been formed in December 2010. IAF has initially planned to procure 45 aircraft. These will be available for joint export subsequently.

SP's: When is the third of the IL-76 based AWACS likely to be inducted into the IAF? In what timeframe (if at all), the IAF is likely to exercise its option to acquire more of these systems and what would be final size of the fleet?
DCAS: The third IL-76 based AWACS will be inducted in IAF by mid-February this year. IAF is processing a case for procurement of additional IL-76 based AWACS. IAF has plans to increase the fleet size in stages so as to meet our national AD requirements.

SP's: Could you give details of the indigenous airborne early warning and control (AEW&C) system under development by the DRDO? What kind of capability accretion is the IAF hoping for, if and when the system gets inducted for operational service and how would these complement the AWACS Phalcon systems?
DCAS: India's indigenous AEW&C programme is being progressed through Defence Research and Development Organisation (DRDO). The platform for the AEW&C is Embraer 145 aircraft. The aircraft is being structurally modified at OEM premises to the AEW&C configuration. The first and second aircraft are expected to be delivered by Embraer to DRDO during the current year. Though the aircraft are yet to arrive, the testing and evaluation of various systems along with the field trials are already under way. The induction would greatly enhance the ability for early detection and contribute as a force-multiplier towards ensuring air dominance in our areas of interest.

SP's: Is the IAF happy with the impending LCA induction in its present IOC configuration? Would the proposed Mk II version be able to meet the operational requirements as spelt out by the IAF? What is likely to be the final size of the LCA programme?
DCAS: Induction of LCA in IOC configuration is a positive step forward to enhance the operational capability of IAF. The LCA Mk-II aircraft fitted with an alternate engine of higher thrust would enable the LCA to meet the IAF requirements. The LCA is expected to replace the MiG-21 fighter aircraft. A total of 40 aircraft of Mk-I version have been contracted for initial procurement with HAL. The final strength would be considered at a later stage, based on progress of Mk-II version.

SP's: The IAF is reportedly transforming itself into a highly networked modern fighting force. Could you give the roadmap of this transformation including details of the proposed integrated air command and control system (IACCS)? When is this feat likely to be achieved? Also, is the IAF working towards acquiring anti-ballistic missile (ABM) capability?
DCAS: IAF is transforming itself into a force capable of undertaking fully network-centric air operations. The IACCS is being operationalised in a phased manner and the first phase would be completely operational by the year end. ABM capability is being developed for the nation by DRDO. SP


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ON A STEADY CLIMB

BIG SHOTS: LARGE INDIAN CORPORATES SUCH AS RELIANCE ARE OPTING FOR LARGE JETS SUCH AS AIRBUS A319 SEEN HERE

PHOTOGRAPHS: FERENC HAMORI, CESSNA & DASSAULT AVIATION

The sales graph is to get further impetus when companies start understanding the benefits of business jets, albeit the recovery of business jets has been slow due to the significant number of pre-owned aircraft in the market on a worldwide basis

By **R. Chandrakanth**

***FORBES* MAGAZINE HAS FORECAST** that Indian business tycoon Mukesh Ambani would become the richest man on earth in 2014, from his present ranking of four. Ten of Asia's top 25 richest are from India, while Hong Kong and Japan each have five and Mainland China has just one. The Indian billionaire club is growing fast and the number is 330 plus, of which 74 entrepreneurs have made their first billion rupees in the last five years.

What has that got to do with business jets? I would say, if not everything, it is the starting block. Mukesh Ambani's mega-conglomerate Reliance Industries owns about 10 aircraft, one of the largest of non-scheduled operators. In 2007, he gifted his wife, Neeta Ambani, an Airbus 319 corporate jet on her 44th birthday. Business tycoon Vijay Mallya owns a fleet of luxury private jets, yachts and the like. There is a co-relation between wealth creation and the growth of business jets. Corporate profits and wealth accretion among high net worth individuals (HNWI) spurs demand for business jets. Historically, HNWIs and private corporations have accounted for approximately two-thirds of business aircraft sales. In 2005, India had about 40 private aircraft and in October 2010, there were about 170 private aircraft and over 250 helicopters.

NO PLANE, NO GAIN

The sales graph is to get further impetus when companies start understanding the benefits of business jets, albeit the recovery of business jets has been slow due to the significant number of pre-owned aircraft in the market on a worldwide basis. A study by the US-based National Business Aviation

Association (NBAA) has indicated that small and mid-sized companies using business aviation have performed better than those which did not use. However, in India, the SMEs are not in the same league as those in the developed countries. Nevertheless, companies which have used business aviation have been categorised as "well-managed companies" with superior financial performance and having better customer access.

There is no doubt whatsoever that business jets are enablers in an increasingly global marketplace. The benefits are many—on-demand flight schedules; the ability to conduct private in-flight meetings; easier access to the company's sites and also customers (which may not be served by a scheduled airlines); and reduced stress on the executive.

In India, the business aviation growth story could be a lot more different if the aviation environment, particularly general aviation, is lot more liberalised and infrastructure comes in place. The requirements are smaller operational airports; fixed based operations; hangars; reduced taxation on imports; liberalised banking procedures, etc.

Despite these hiccups, the forecast of business jet sales for the region per se is encouraging. The demand for entry-level 'light jets' costing about ₹16 crore is on the rise and light jets currently account for a little over 30 per cent of the business jets in India. The manufacturers are waiting in the wings to capture the market that is going to unfold in the near future.

INDIA FOOTPRINT OF OEMS

Bombardier

Irrespective of these stumbling blocks, major business jet manufacturers are betting big on India. Canada-based Bombardier understands that India with a GDP growth of over 8 per cent and low business jet penetration, the opportunities for expanding business remains high. The Indian business jet fleet is expected to grow at a compounded annual growth rate (CAGR) of 13 per cent over the next 10 years, and would touch 440 aircraft by 2019.

Bombardier's global forecast is nearly 11,000 bizjets worth close to $210 billion (₹9,45,000 crore) to be delivered in the same period. At the end of 2009, the worldwide business jet fleet was about 14,200 aircraft, expected to grow by 3.6 per cent CAGR over the next 20 years. Bombardier, which is a market leader, offers three families of high performance business jets—Learjet, Challenger and Global. Bombardier will soon offer clean-sheet replacements for the Global Express XRS and Challenger 605, for entry into service in 2015 and 2016.

Cessna

Similarly, Cessna, a Textron Inc. company, with a fairly good aircraft base in India, plans to expand on this. In March last, Cessna organised its first India customer demonstration tour of Citation Mustang. "Over the past several months, we have seen increased interest in the Citation family of business jets, especially the Citation CJ2+ and Citation XLS+," said Todd Duhnke, Director, International Sales. Cessna's authorised sales representative and service facility is Taneja Aerospace and Aviation located in Bangalore.

Cessna's Trevor Esling said, "Of all the markets in the region, India has probably been the quietest this year for light and medium business jets." However, by 2025, India is expected to be in the world's top 10 countries purchasing business aircraft.

In 2009, Cessna worldwide delivered 754 aircraft, including 289 Citation business jets, and reported revenues of about $3.3 billion (₹14,850 crore). Since the company was originally established in 1927, more than 192,000 Cessna airplanes have been delivered around the world, including more than 6,000 Citations, making it the largest fleet of business jets in the world. Cessna is planning to relaunch the large-cabin Citation Columbus for entry into service in 2016.

THE INDIAN ECONOMY IS GROWING STRONGLY

"India is important to Cessna and the expanding economy should soon support a robust business aircraft fleet and infrastructure. The Indian market has readily accepted both the Citation CJ2+ and the Citation XLS+ as particularly strong aircraft for the subcontinent, alongside the Citation Sovereign. These aircraft offer excellent short-field capability in hot climates and non-stop capability anywhere within India, so are well-suited to the market.

There are currently 20 Cessna Citation aircraft operating in India, part of a total fleet of around 100 business jets right now. I would expect to see a total business jet fleet of 200-250 aircraft in India in 10 years' time.

There are nonetheless bureaucratic and regulatory issues that are not very favourable for the business jet market in India, such as high import taxes and the difficulty of transferring money into and out of the country. These issues are certainly inhibitors to the fast acquisition of aircraft. Furthermore, the limited business aviation infrastructure is currently an impediment to the development of the Indian business jet market.

There is a need to increase the number of business aviation airfields and fixed base operations (FBOs) in place, and to ease the restrictions on when aircraft can land. Airports tend to prevent business jets from landing at peak times and, without FBOs, business jet passengers need to be processed through the same terminal facilities, such as security, as all other passengers. Furthermore, a larger supply of professional aircraft management companies and indigenous pilots will be a key ingredient for further growth.

By 2025 I would expect India to be in the top 10 individual countries for business jet ownership outside the US."

—TREVOR ESLING, VICE PRESIDENT, INTERNATIONAL SALES, CESSNA

FALCON FLIES

In the last few years, Dassault has invested heavily to increase its footprint in Asia. We opened a new office in Beijing last year (2010) in addition to our existing sales offices in Hong Kong and Kuala Lumpur. We've been in India for a long time and we have been successful, when you consider our market share which is over 60 per cent in the large cabin segment.

Till date, the best performing aircraft has been the Falcon 2000 series, because of its exceptional flexibility and low operating cost. A Falcon 2000 can fly you from south to north India nonstop, in a large and comfortable cabin. At the top of our range, the Falcon 7X was certified in India last year (2010) and is becoming more attractive in India. We have already sold six Falcon 7Xs in India; the first was delivered in early 2010 and we will deliver the other five - along with 10 more Falcon aircraft (Falcon 900s and 2000s) - within the next two years.

We are continuing to increase our efforts locally to ensure our operators continue to benefit from cost efficient and reliable operations, with the optimum support and response.

Our aircraft are also very cost-effective to run as they use up to 40 per cent less fuel than other aircraft in the same category, even with three engines (such as the Falcon 900LX and 7X). This is very important in India, as operators and owners are focused on operating costs. It also means lower gas emissions—another important factor in a market which is very concerned about environmental issues.

—THIERRY DE PONCINS, SALES DIRECTOR, FALCON INTERNATIONAL

Gulfstream

Jason Akovenko, Regional Vice President, Asia-Pacific, Gulfstream, pointed out that while the US has nearly 11,000 jets, India has less than 200, and that provides considerable room for growth. There are 17 Gulfstream aircraft in India, all of them in the mid-to-large cabin segments. "Companies and individuals will need to fly farther as business expands among continents, providing an incentive to trade up to larger Gulfstream models or acquire Gulfstream aircraft for the first time," said Akovenko.

He said that Gulfstream is excited about the future as the Indian aviation industry is strong and vibrant. "Gulfstream continues to expand its commitment in the country by significantly increasing marketing and product support activities to serve our customers," he added.

Gulfstream has produced over 1,900 aircraft for customers around the world since 1958. To meet the diverse transportation needs of the future, Gulfstream offers a comprehensive fleet of aircraft and is working on replacing the G350 and G450 with highly improved G360 and G460 by 2015.

Dassault Falcon

Endorsing similar market sentiment is the President and CEO of Dassault Falcon, John Rosanvallon who has stated, "As the country's economy continues to strengthen there will be an increasing need to connect India efficiently with other major centres of trade around the world. For example, the Falcon 7X provides direct, non-stop access from Chennai to London."

The Falcon fleet is well established in India, with 16 Falcon 2000 and 900 models. Another dozen Falcon aircraft are on order with deliveries anticipated within the next three years. The company has been focusing on Falcon large cabin business jets, including delivery of the first of six Falcon 7X aircraft along with the Falcon 2000EX. The 7X is Falcon's best selling model, with more than 200 orders from 42 countries. Dassault has the highest market share in the large cabin business jet segment in India and to provide enhanced customer service here, it opened a spares distribution centre and also relocated a Customer Service Manager from France to Mumbai.

Embraer

Asia has been a very special market for Embraer. "We have 10 per cent of our Legacy 600 fleet flying in the region, we have a significant amount of customers on our firm backlog for all Embraer Executive Jets products and even in the difficult economic environment the whole world is going through we still see relevant growth in Asian countries and this is a key demand driver for our products," said Jose Eduardo Gandara Costas, Vice President, Sales & Marketing, Asia-Pacific, Embraer Executive Jet.

Embraer has a huge order from Mumbai-based Invision Air for 19 light jets and the first of it was delivered in November last. That is just the beginning for the Brazilian company.

With a vision to become one of the market leaders in executive aviation by 2015, Embraer is consistently launching new products since the Legacy 600 super mid-size jet entry into service in 2002. Subsequently, it launched the Phenom 100 and the Phenom 300 jets in 2005 (entry level jet and light jet, respectively), the Lineage 1000 Ultra Large Jet in 2006 and the Legacy 450 and 500 jets (mid-light and mid-size categories, respectively) in 2008.

Hawker Beechcraft

Hawker Beechcraft has reportedly garnered over 50 per cent of the market share in India of the turbo business aircraft. For the US company, the market focus outside the US has been Brazil and India. To address the Asian needs, Hawker has expanded its sales and support team in India. Todd Hattaway is the Regional Sales Director based out of Delhi.

In March 2010, the first Hawker 4000 arrived in India as Hawker Beechcraft Corporation continued to see growth and demand in the Asian market. The company sees continued success, future growth opportunities as a market leader in India. Justin Firestone, President, Asia-Pacific said, "As the market leader for business aircraft in India, we are focused on the needs of the discerning customers in this region and are very much committed to continue providing world-class service and support." SP

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INDIA Emerging

The world is focusing its attention on India, amply illustrated by the 2010 visits by a number of heads of state. The markets are here and no global company can afford to ignore.

By **R. Chandrakanth**

AS THE LARGEST DEMOCRACY and the fastest growing economy, India has arrived on the centre-stage. The world is focusing its attention on India, amply illustrated by the 2010 visits by a number of heads of state (the US President Barack Obama; UK Prime Minister David Cameron; French President Nicolas Sarkozy; Chinese Premier Wen Jiabao; and Russian President Dmitry Medvedev). All are keen on strengthening and furthering bilateral relations with India.

The economy has been growing at 8.9 per cent for two consecutive quarters in the current financial year that ends in March. If India sustains a 6 per cent growth rate for 50 years, it is expected to equal or overtake China in that time. The markets are here and no global company can afford to ignore.

Since India embarked upon an economic reform process in 1991, the flow of foreign investment has grown by leaps and bounds. India received foreign direct investment worth $175 billion (₹7,87,500 crore) from April 2000 to October 2010, according to the Department of Industrial Policy and Promotion.

In this context of growth and coinciding with a premier aerospace event in the region—Aero India International Air Show 2011—*SP's Aviation* in this "Aero India Special Edition" has endeavoured to highlight the market potential in military and civil aviation. As the race for the medium multi-role combat aircraft (MMRCA), valued at about $10 billion (₹45,000 crore), is hooting up, the market for both Indian and global defence majors is humongous.

The effort here is to give a pulse of the market potential in different segments of military aviation—fighter aircraft; transport aircraft; helicopters; force-multipliers; armaments, etc—and in civil aviation—airlines; business jets; maintenance, repair and overhaul (MRO); airports, etc. The market figures mentioned here are approximate as it is a long-haul perspective, which is highly dynamic and ever changing. SP

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The rotary-wing market for just the military helicopters presents a mouth-watering picture for helicopter manufacturers around the world

WHILE THE IAF HAS continued to strive to maintain a balanced helicopter force for the multifarious tasks, it is required to carry out routinely, the other two wings of the armed forces namely, the Indian Army and the Navy—having appreciated the utility of these versatile machines—are seeking to acquire helicopters in much greater numbers. The turn of the millennium witnessed a great surge in the requirement of helicopters by all three services; nudging the Defence Acquisition Council (DAC) of the Ministry of Defence (MoD) to go into a high-drive by approving in principle the cumulative acquisition of as many as 695 helicopters by the defence forces. Clearly, this has opened up a huge market for the manufacturers of helicopters worldwide—both domestic and abroad—as the requirement includes all possible types of helicopters.

The IAF will be the biggest procurer of rotary-wing assets to meet its varied tasks. The process has already commenced with the IAF starting to acquire Russian-built medium-lift Mi-17 V-5 (also known as Mi-171) out of an initial order of 80 units valued at $1.2 billion (₹5,400 crore). The IAF is reportedly going in for another 40-60 with the total package coming close to or even exceeding $2 billion (₹9,000 crore). In addition, deliveries of the indigenous advanced light helicopter (ALH) Dhruv continue with a total induction of 54 units (38 utility and 16 armed versions). The IAF is also in the market for 22 attack helicopters and 15 heavy-lift helicopters for which RFPs had been issued earlier to the global manufacturers from both side of the Atlantic. In this context, the US Defense Security Cooperation Agency (DSCA) has gone ahead to the extent of having notified the Congress on December 22 last year of a foreign military sale (FMS) to the Government of India of a possible direct commercial sale (DCS) of 22 Boeing AH-64D Block III Apache helicopters package worth $1.4 billion. Similarly, Boeing is also confident of bagging the IAF's order of 15 heavy-lift helicopters with its offering of CH-47F Chinook which may also be sold to India through the FMS route. Together, the two contracts are likely to exceed $2 billion (₹9,000 crore).

"The Fennec is our most advanced helicopter, fully compliant with the quality requirements of the Indian Army and the Air Force. It is a military certified and combat proven helicopter and the most powerful version in the Fennec family. In fact, it is the only helicopter that has a successful track record while the other helicopters in its class are still experimental. In terms of manufacturing capacity, more than 300 Fennec/Ecureuil helicopters are manufactured every year. Given a production rate of approximately 1 helicopter a day, we are today best geared to deliver the 197 units required by the Indian Armed Forces at the earliest. We are very happy with the Fennec's performance during the recent trials and are confident that it is the rightful successor of the Cheetah and Chetak."

RAINER FARID, VICE PRESIDENT SALES, ASIA PACIFIC, EUROCOPTER

The scenario on the light utility helicopter (LUH), however, is somewhat different where the Government of India has cleared combined procurement of 384 three-tonne class machines worth approximately another $2 billion (₹9,000 crore) to replace the ageing fleets of Cheetah and Chetak helicopters, which have been around for more than four decades. Of these, 125 would go to the IAF and the Indian Army would get 259. As a part of this project, the government has for the second time floated

continued on page 52...

$80-$100bn MARKET

Keeping in view the geopolitical scenario and emerging threats, the IAF plans not only to catch up but also further augment its jet fighter fleets to reach a higher level of a 42-squadron force by 2022

ARMED WITH THE POLITICAL approval of 45-squadron combat jet fighter force in the 1960s, the Indian Air Force painstakingly built up its fighter fleets to reach a force level of 39½ squadrons. But due to the forced Sabbath from any new inductions during the period late 1980s to almost the entire 1990s, the IAF began to witness a downslide in the combat force levels. The IAF's MiG-21 squadrons started to fall like nine pins burdened under the unsustainable weight of obsolescence. If the Su-30 induction had not materialised, the IAF would have truly found itself in dire straits.

The wakeup call couldn't have come sooner for the IAF. While the IAF was able to arrest further fall from the dismal 28-29 squadrons level that it had plunged to by inducting greater number of Su-30 MKIs being licence-produced by HAL, it also opened up venues for induction of many other types, creating a huge market in India for the sale of modern jet fighters.

Leading the pack of new fighters to rebuild and enhance IAF's combat strength is the Su-30 MKI with a total order having reached a figure of 272 through an ongoing programme, worth approximately $15 billion (₹67,500 crore). The IAF has so far received 124 aircraft. The indigenous LCA is getting closer to its planned induction into the IAF with the ceremonial handing over of the initial operational clearance (IOC) certificate by none other than the Defence Minister A.K. Antony himself to the IAF Chief Air Chief Marshal P.V. Naik on January 10. In all, the IAF is planning to induct 200 fighters and 20 trainer version of the aircraft. The Indian Navy plans to buy at least 50 naval version Mk II LCAs in due course. The total outlay could exceed $10 billion (₹45,000 crore).

The much touted MMRCA programme is slowly inching towards the final stages of India's tortuous procurement procedure for defence equipment. The $10-11 billion (₹45,000 crore-₹49,500 crore) programme for 126 aircraft has a built-in clause for 200 aircraft which is more than likely to happen with the acquisition costs exceeding $15 billion. The US Lockheed Martin with the offer of the F-16IN Super Viper and Boeing fielding the F/A-18 E/F are likely to use Aero India 2011 as the final push for the mega deal. Other competitors in the fray are the French Dassault Rafale, Eurofighter Typhoon, the Russian MiG-35 and the Swedish Saab Gripen. There are indications that selection of a US fighter in the MMRCA tender could pave the way for the IAF to excess the next generation technology in the form of Lockheed Martin's F-35 under development.

Notwithstanding the above, India through its own initiative has joined Russia to co-develop and co-produce PAK-FA fifth generation fighter aircraft (FGFA) based on the already under flight-testing T-50 aircraft. Spread over the next two decades, at a projected cost of $35 billion (₹1,57,500 crore) plus for around 250 aircraft for the IAF, it would perhaps be the biggest defence project in India's history. India's DRDO is also embarked upon taking its expertise in developing the LCA to the next level by developing a bigger twin-engine version called the medium combat aircraft (MCA) for the IAF.

Keeping in view the geopolitical scenario and emerging threats, the IAF plans not only to catch up but further augment its jet fighter fleets to reach a higher level of a 42-squadron force by the end of Thirteenth Five Year Plan i.e. 2022. Once achieved, the level could be raised further to attain a 50-squadron force to cater for a two-front operational requirement, which translates to more than 1,000 combat jet fighters on its strength. Clearly, there is a huge market of more than $80 billion (₹3,60,000 crore) to build up the IAF's jet fighter force. If one was to add its sister service Indian Navy's requirements as well, the total outlay could well exceed the $100 billion (₹4,50,000 crore) mark in the coming decades. SP

—Air Marshal (Retd) V.K. Bhatia, New Delhi

PHOTOGRAPHS: ABHISHEK / SP GUIDE PUBNS & MIG

LOOKING UP TO $5 BILLION

At present the trainer fleets of all the three stages—basic, intermediate and advanced—are under transition

THE FOUNDATIONS OF OPERATIONAL capability of the IAF are built up through sound flying training that for long has been structured on a three-stage process designated as basic, intermediate and advanced, with each stage assigned a separate fleet of trainer aircraft. Currently, the trainer fleets of all the three stages are under transition. The HAL built piston-engine HPT-32 basic trainer aircraft remains grounded since August 2009 after a large number of accidents including one in July 2009 wherein two flying instructors perished. Efforts are on to restore airworthiness of the HPT-32 fleet through modifications including fitment of the aircraft parachute recovery system. However, even if the effort succeeds, the fleet may only serve a limited purpose. Meanwhile, with the aim to switch over to training on turboprop aircraft for the basic stage, the IAF has completed trials of the five types shortlisted. These are the US Hawker Beechcraft T-6C, the Pilatus PC-7 Mk II, the Korean Aerospace Industries KT1, EADS PZL130 Orlik TCII from Poland and Grob 120TP from Germany. A total of 75 aircraft at an estimated contract value of $900 million (₹4,050 crore) are to be procured from abroad. The contract is expected to be signed by March 2011 and the vendor may take 18 months to deliver the first batch of 12 machines. Maintenance of the fleet will be the responsibility of HAL i.e. proceeding with the development of the HTT-40, also referred to as the indigenous basic trainer aircraft. Their proposal is under consideration at Air Headquarters.

The intermediate stage conducted since mid-1970s on the HAL-built HJT-16 Kiran aircraft has been eagerly awaiting the intermediate jet trainer (IJT). Christened as Sitara, the first prototype took to the air on March 7, 2003. Fitted initially by a Snecma Larzac 04-H-20 turbofan non-afterburning engine developing 14.12 kN, the production models will be powered by a more powerful Russian Saturn AL-551 engine delivering a thrust of 16.9 kN. The prototype with Russian AL-55I engine undertook its maiden flight on May 9, 2009.

Although the initial operational clearance is expected by mid-2011, production of the first batch of 73 aircraft ordered by the IAF has already commenced. The total requirement for the IAF and the Indian Navy together is expected to be in the region of 250 aircraft. The project is running behind schedule by four years and current estimates are that the Kiran fleet will be replaced fully by 2015.

After an acquisition process that took over two decades to fructify, the BAE Hawk 132 was finally selected in 2004 for induction into the IAF as the advanced jet trainer. Orders were placed for a total of 66 aircraft of which 24 were to be bought in a fly-away condition and the remaining 42 would be manufactured under licence by HAL. The total value of the contract was $1.2 billion (₹5,400 crore). Of the total of 66 aircraft ordered initially, 24 have already been delivered by the original equipment manufacturer (OEM). However, of the remaining 42 aircraft, only 16 have so far been delivered by HAL. Production at HAL has been adversely affected by a number of contractual issues with the OEM, which apparently have now been resolved. This is evident from the fact that after floating an open tender in February 2009 for a fresh batch of AJTs in July 2010, BAE has received follow-on order for 57 additional Hawk 132 aircraft costing over $1 billion (₹4,500 crore). The third stage of training is progressing satisfactorily.

Hopefully, the trainer fleet of the IAF will stabilise by the middle of this decade. SP

—Air Marshal (Retd) B.K. Pandey

PHOTOGRAPH: ABHISHEK / SP GUIDE PUBNS

MAMMOTH MACHINE:
C-17 GLOBEMASTER III

PHOTOGRAPH: ABHISHEK / SP GUIDE PUBNS

$12-15bn BUSINESS POTENTIAL

About 25 years since the last major upgrade, the transport fleet of IAF is badly in need of not only upgradation but also a major transformation

THE TRANSPORT FLEET OF the IAF underwent a major upgradation in the early 1980s with the induction of 17 IL-76 (one and a half squadrons) strategic airlift aircraft with a payload capacity of 43 tonnes, 225 fully equipped troops or 140 paratroops. In the medium tactical transport aircraft category, the IAF acquired 110 An-32 aircraft (seven squadrons). With this, the IAF acquired the capability to carry out in a single wave, an airborne assault with a Battalion Group or air land a Brigade size force. These capabilities were effectively demonstrated in Sri Lanka and the Maldives in the late 1980s.

About 25 years since the last major upgrade, the IAF is badly in need of not only upgradation but also a major transformation. In the context of the enhanced responsibilities, the IAF needs to acquire the capability to undertake and support airborne assault operations with a Brigade Group or to air land a Division size force. As such operations may have to be mounted across our national frontiers anywhere in the region of interest; the IAF would need aircraft with the right attributes.

The IAF has identified the C-17 Globemaster III as the likely replacement for the IL-76 fleet. With more than twice the payload capacity of the IL-76 and transcontinental operational range, the C-17 will provide a quantum jump in strategic airlift capability provided the aircraft is acquired in the right numbers. The IAF is pitching for 10 of the mammoth machines for an investment estimated to be anywhere between $4.1billion (₹18,450 crore) to $5.8 billion (₹26,100 crore). The final outlay will depend not only on the numbers acquired but also on the structure of the package that could include performance based logistic support, a concept that is yet to be introduced in India. The IAF is contemplating purchase of another six at a later date. The total number of 16 could well be a reflection of the mindset related to current holdings. However, given the nation's expanding strategic horizons, the total number acquired ought to be many times more. There is therefore business potential for not only Boeing but also for other players with the capability to manufacture strategic airlifters of comparable capability.

In the medium tactical airlift segment, the 26-year-old fleet of An-32 is no longer fit to cope with the envisaged operational tasks and despite the current mid-life upgrade programme, needs not only to be replaced but the fleet capacity should also be enhanced in conformity with the new level of demand both for swift response to internal and external security commitments. India has entered into an agreement with Russia for a $600 million (₹2,700 crore) project for collaboration to develop at a cost of a 15 to 20 tonne payload capacity twin engine multi-role transport aircraft (MTA) of which the IAF plans to initially order around 50. As the aircraft would be manufactured by the Hindustan Aeronautics Limited, in due course the numbers could be increased in conformity with task. Designated as the IL-214, the prototype is expected to take to the air before the end of the decade. Initial plans are to build around 205 of these and more in accordance with demand both domestic and international. Although an Indo-Russian design, the aircraft is likely to carry systems and avionics of western origin. At an estimated cost of $3 million (₹13.5 crore) per tonne of payload, the IL-214 by standard yardsticks could cost around $45 million (₹202 crore). For 205 aircraft, this project has a business potential of $9 billion (₹40,500 crore) over the next three decades.

An entirely new dimension to the airlift capability of the IAF has been added with orders for six C-130J Super Hercules valued at $1 billion (₹4,500 crore). Indications are that another six would be acquired soon, possibly for another $1 billion. There are other requirements for transport aircraft both of the IAF and of the paramilitary forces. The IAF would seek to find a replacement for the Avro HS 748 and the Border Security Force is planning to buy a few. The 12-tonne capacity Alenia C-27J Spartan class of aircraft could be an appropriate choice.

The transport fleet of the IAF could well provide a rich hunting ground for the global aerospace majors in the decades ahead. SP

—Air Marshal (Retd) B.K. Pandey

BILLION DOLLAR MARKET

The IAF would surely work out its actual and recurring requirements of different types of weapons, but it is certain that a market worth billions of dollars awaits the weapon manufacturers across the globe

HELLFIRE II MISSILE LAUNCHED FROM A COBRA AH-1Z

AGM-65 MAVERICK MISSILE FROM AN A-10 THUNDERBOLT II

HARM MISSILE

PHOTOGRAPHS: LOCKHEED MARTIN & USAF

AS THE IAF GRADUALLY sheds its legacy fighters (MiG-21 being the archetypical example) the replacements will comprise fourth plus generation fighters. With induction of 270 Su-30 MKI, 126 medium multi-role combat aircraft (MMRCA) and about 80 Tejas by 2020, it will be a new look Air Force with a vastly enhanced potential. All new aircraft would be multirole capable and therefore fighter assets which qualified exclusively for air defence or which had to be put aside for EW support and would be a matter of yore. In terms of strike potential, the air arm will really come into its own.

However, the platforms provide just the potential for effectiveness. It is the quality and quantity of weapons that really makes the difference. Increasingly lethal air defence environment makes it necessary to reduce exposure of expensive platforms to the very least while maximising mission effectiveness. Therefore, precision has to be a key feature of all air-to-surface ordnance. Precision also makes it possible to miniaturise weapons, which in turn offers an opportunity to put aloft many more shots in every mission, and place just the right amount of ordnance at the right place to achieve a measured result.

The surface targets list being long, characteristics and environment of each being different from the other, a variety of precision weapons would be necessary to undertake the entire spectrum of missions. Engagement of targets lying behind light terminal defences could be undertaken with smart bombs—their guidance, explosive power and fusing being determined by target characteristics. Targets in depth or heavily defended by strong multi-layered defences, would call for attacks with missiles of appropriate range and warheads. Dictated by some air defence environments, supersonic, stealth cruise missiles of the BrahMos variety may have to be weapons of choice.

Considering the likely operational environment and target density at different depths in our area of interest, IAF could consider 50 per cent of its explosive ordnance (approximately 25,000 pieces) to comprise smart bombs with varying types of guidance (viz. laser, LLTV, thermal, INS/GPS) explosive power and penetration capability, etc. Specialised capability to engage very high value and strategic targets i.e. shipping, heavily defended airfields, radar and missile sites, etc could reside in the air-to-surface missiles of different ranges and capacities.

Costs of even similar weapons could vary substantially depending on the version, source, quantities in question and a variety of other factors. Therefore, estimating expenditure required to equip an Air Force for large-scale employment of smart munitions can be hazardous. However, some ball park figures may be used to arrive at rough estimates.

A Paveway II series, which effectively converts a dumb iron bomb into a smart one, is said to cost around $19,000 (₹8,55,000). A joint direct attack munitions (JDAM) kit for the same purpose but relying on an Inertial Navigation System (INS) and global positioning system (GPS), which can engage static targets from a standoff distance up to 24 kmh with a CEP of within 10 metres, could cost $21,000 (₹9,45,000) per strap-on guidance kit. To engage mobile targets, a data link could be incorporated to update the target position at some additional cost. A modern, short-range missile like AGM-114 (Hellfire) with a range of up to eight km is said to cost around $65,000 (₹29,25,000). This may be taken as an indicative cost of a short-range missile.

The well-known Maverick AGM-65 has been built in several variations and the unit cost is said to vary from $17,000 (₹7,65,010) to $10,000 (₹4,50,000). The average cost of this category may be assumed as $1,00,000 (₹45,00,000) per shot.

AGM-88 HARM anti-radiation missile designed to seek and destroy enemy radar-equipped air defence systems costs around $20,000 (₹9,00,000). A long-range cruise missile like the Brahmos is said to cost in excess of $2.5 million (₹11.25 crore).

The IAF would surely work out its actual and recurring requirements of different types of weapons, but it is certain that a market worth billions of dollars awaits the weapon manufacturers across the globe. SP

—Air Marshal (Retd) A.K. Trikha

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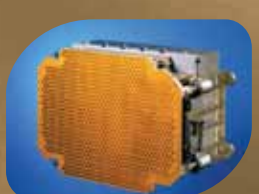

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$20bn+ MARKET

Ballistic missile defence (BMD) is an area which is yet being explored and DRDO has carried out some trials but India is yet to go a long way to achieve some sort of semblance of BMD on ground

By **Lt General (Retd) Naresh Chand**

SURFACE-TO-AIR MISSILES (SAMS) ARE used by the Army, Navy and the Air Force for providing point and area air defence. Ballistic missile defence (BMD) is an area which is yet being explored and DRDO has carried out some trials but India is yet to go a long way to achieve some sort of semblance of BMD on ground.

MAJOR MISSILE SYSTEMS OF THE INDIAN ARMY

Quick Reaction SAM (QRSAM): The current system is OSA-AK which is a mobile system of Russian origin. Trishul was being developed by Defence Research and Development Organisation (DRDO) to replace OSA-AK, but was not successful. A request for proposal (RFP) was issued earlier but was later withdrawn. A fresh RFP is expected to be issued shortly. MBDA's Maiterya which is being jointly developed with the DRDO, Raytheon's surface launched advanced medium range air-to-air missile (SLAMRAAM) and Hawk XXI, Spyder of Israeli origin (already inducted into Indian Air Force), Russia's Tor M-1 are few of the systems in the run. The average cost of a regiment is about $1 billion (₹4,500 crore) plus depending upon the system selected.

Medium Range SAM (MRSAM): The current system is Kvadrat of Russian origin. DRDO was developing Akash but that has been found more suitable for static tasks. Twelve batteries of Akash have already been contracted and the Army still needs MRSAM for mobile tasks. Russia's BUK-M1, Aster30, MICA, Patriot missile and its variants like PAC-2 GEM, GEM/C, GEM/T (or GEM+) (made by Raytheon) and most advanced Patriot Advanced Capability-3 (PAC-3) made by Lockheed Martin could be in the run but Israel and DRDO have a joint venture for MRSAM (earlier named Barak 'Next Generation') with a possible range of 70 km. This is an IAF project but could be used by the Army. However, for the interim period, Army may go for some other equipment. Each regiment of MRSAM may cost about $1.5 billion (₹6,800 crore) plus depending upon the numbers and type of system selected.

Shoulder fired SAM systems: The current system is Igla which is also in service with the Navy and the Air Force. Some current systems like Starstreak of UK, Stinger Block 2 of the US and Mistral of France could be considered as a successor. IAF and Indian Navy also hold Igla missiles which need replacement. If the defence forces collectively buy the same system then they will have good bargaining power as the numbers will be very large.

MAJOR MISSILE SYSTEMS OF THE INDIAN AIR FORCE

Pechora: Pechora's successor was to be Akash but due to delay, other options were explored. Pechora is considered equivalent to MRSAM. DRDO and Israel Aerospace Industries have set up a joint venture to develop and co-produce a new generation of MRSAM at an approximate cost of ₹10,000 crore (about $2.2 billion), which includes development and manufacture equivalent of about nine squadrons. However, the cost is likely to increase due to inflation and other factors. Meanwhile, the Air Force has inducted about two squadrons of the indigenous MRSAM Akash as an interim measure. It is understood that six more squadrons have been contracted.

QRSAM: The Air Force holds OSA-AK which was to be replaced by Trishul but due to its failure, government clearance was given during August 2009 for the acquisition of 18 SpyDer systems (equivalent of three squadrons) from Israel's Rafael at a cost of about $1 billion (₹4,500 crore). The deliveries will start in early 2011 and completed by August 2012.

MAJOR MISSILE SYSTEMS OF INDIAN NAVY

Barak System: The Navy is currently holding about 11 systems of Rafael's Barak-1 SAM for its ships. A joint venture between DRDO and Israel was signed for ₹2,600 crore (about $0.57 billion) to develop Barak-2 MRSAM with a range of 70 km. This system is earmarked to equip Project 17A stealth frigates and Project 15A Kolkata Class destroyers. The cost for the first phase is ₹11,662 crore (about $2.5 billion), meant to equip the three Kolkata-class destroyers.

Market: A conservative estimate is that it will be about a $20 billion (₹90,000 crore) plus market spread over at least 10 years and will include complete systems. Shoulder-fired missiles when acquired will have an additional cost. SP

PHOTOGRAPH: ABHISHEK / SP GUIDE PUBNS

Cassidian creates strategic partnerships with India

The EADS Division is committed to increase its industrial footprint

CASSIDIAN CONSIDERS INDIA AS a key market with an expanding defence and security industry and even more so as a rapidly growing country which offers excelllent opportunities for long-lasting strategic partnerships. Therefore Cassidian is fully committed to invest in India's industry and people and is ready to listen to and learn from its Indian customers. In the past few years, Cassidian created several partnerships with organisations such as the Defence Research and Development Organisation (DRDO) which build a solid basis to expand the cooperation with Indian companies.

An excellent example for the commitment to increase the industrial footprint in India is the new **Cassidian Engineering Centre in Bangalore** which has been established to provide engineering services to European partners as well as Indian customers. The Engineering Centre is the first defence-related centre of this kind created by a foreign company in India. 25 Indian engineers from the Engineering Centre in Bangalore have already been sent to the facilities in Germany to attend technical and intercultural training courses.

Major programme is the **Eurofighter Typhoon** which is developed and manufactured by Alenia Aeronautica/Finmeccanica (Italy), BAE Systems (UK) and EADS (Germany, Spain). Up to now, the orderbook comprises more than 700 orders from six customers (Germany, United Kingdom, Spain, Italy, Austria, Saudi Arabia) and 250 aircraft have been delivered. Deliveries of 15 aircraft to Austria as the first export customer have been completed and deliveries of 72 aircraft to Saudi Arabia as the second export customer are making progress.

Cassidian offers integrated solutions for network-centric operations, flexible and interoperable services as well as outstanding communication capabilities based on the latest technology. As an example for the commitment to India, Cassidian acted as the design and integration authority to the Indian Army for its test bed system called Parikshak. This system is being used to help the Indian Army investigate the capabilities that could be delivered for the new **Tactical Communications System (TCS)** project.

In 2008, Cassidian has been awarded with India's **first major public safety TETRA network contract** by the police of the state of Andhra Pradesh. The new network will cover the region of Cyberabad, the high-tech hub that surrounds the city of Hyderabad, which is a strong root for India's current economic growth. In 2009, Cassidian signed a contract to deploy a **modern TETRA radio network to secure the Indian Parliament**. Cassidian has teamed up with its local partner Sanchar Telesystems Limited to provide the Indian Parliament in New Delhi with a digital, GPS-based, encrypted communication system. In 2010, Cassidian was awarded a contract by the Indian Defence Research and Development Organisation (DRDO) to supply consultancy services to the Indian armed forces in developing the system architecture of its **Airborne Early Warning & Control (AEW&C) programme**.

Cassidian maintains close cooperation with the Indian industry and R&D organisations. One example is the successful cooperation with DARE to develop a **Missile Approach Warning System (MAWS)** for Indian rotary-wing and wide-body aircraft. The sensor has been adapted to the Indian forces' self-protection suite and has been certified as "indigenous equipment". SP

NEED FOR Bigger Platform

IAF will soon have most of the combat aircraft capable of being refuelled in mid-air

PHOTOGRAPH: SP GUIDE PUBNS

THE BEGINNING OF THIS millennium has seen introduction of two major force-multipliers in the Indian Air Force (IAF). First were the flight refuelling aircraft (FRA) in 2003 and the airborne warning and control system (AWACS) in 2009. Undoubtedly, it has taken the IAF into a different league, able to cover a much larger operational footprint. It is equally praiseworthy that operators and the maintenance staff of the Indian Air Force (IAF) have been able to not only absorb the newer technologies but also exploit these to the Indian requirements.

Having inducted 6 IL-78 FRA in 2003, the IAF has bid for six more tankers and a RFP has been issued in September 2010. The new contract could be worth about $2 billion (₹9,000 crore) with IL-78 and Airbus A330 as likely contenders. Boeing has not entered the race with its 767 based tankers.

IAF will soon have most of the combat aircraft capable of being refuelled in mid-air. There is no doubt then that the need for FRA will also increase in the years ahead enabling the IAF to use the country's depth to its advantage. Unlike the aircraft or radar strengths, there are no specific government approved numbers for the tankers or AWACS. However, the IAF will need to convince the Ministry of Defence on the logic for asking more of these. Ideally, two tankers per squadron would allow total flexibility of planning operational missions, but it will naturally mean a much higher budget provision. With induction of C-130J aircraft for Special Operations, it is possible that mid-air refuelling of helicopters to be used in such operations will also need to be planned in future acquisitions.

As regards the AWACS, having inducted three Phalcon IL-76 aircraft for about $1.1 billion (₹4,950 crore), the IAF would already be looking for more of these to cover India's vast territory as also to cater to redundancies. Towards this, IAF is partnering with the DRDO for the indigenous airborne early warning and control system (AEW&C) currently being configured on Embraer-145 aircraft. First of the three such aircraft is expected to be rolled out in early 2011, probably coinciding with Aero India 2011. The cost reported is about $385 million (₹1,733 crore). A number of Indian small and medium enterprises (SMEs) have benefitted as subcontractors, though the overall system integration would need some expertise from abroad. In future, it is likely that the platform chosen would be bigger to cater to longer loiter time and range. Such aircraft will also need links for data transfer and ground exploitation stations to produce recognisable air surface picture (RASP), apart from other support and maintenance apparatus.

Apart from the IAF, Indian Navy has also evinced interest in the indigenous programme for its aviation arm, not to mention the need for in-flight refuelling capability at present being shared with IAF. When fructified, the combat potential of the country would be enhanced multifold. SP

—Air Marshal (Retd) B.N. Gokhale

Air Chief Marshal S. Krishnaswamy
Former Chief of the Air Staff

Move the Ball FAST

We no longer hear many complaints on lack of budget support from the Services. Instead, we hear criticism about the 'processing ability' to project and progress through the labyrinth of defence acquisition machinery that has been fortified against every conceivable malpractice. The ball is now firmly in the court of the military to speedily move through the maze.

'MODERNISATION OF DEFENCE' IS a mantra that reverberates constantly across the spectrum that voice concern on India's national security. The need is acknowledged at all levels of military institutions and the government. Government watchdogs such as the Public Accounts Committee and the Standing Committee of Parliament for Defence have been critical on maximising budgetary support for modernisation and in the past have passed strictures over surrendering unspent annual budget allocated for modernisation. This has initiated improvement over policies and practices on defence expenditure and the possibility to carry forward unspent allocation to the subsequent year. At the Prime Minister's level, the country has been assured of meeting defence modernisation needs. We no longer hear many complaints on lack of budget support from the Services. Instead, we hear criticism about 'processing ability' to project and progress through the labyrinth of defence acquisition machinery that has been fortified against every conceivable malpractice. The ball is now firmly on the court of the military to speedily move through the maze.

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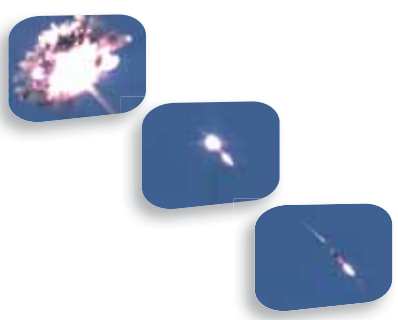

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The Air Force seems to have succeeded well in working at the labyrinth. Many new inductions have gone through well and they are confident of pushing the rest that they may have envisioned. The next Chief of Air Staff is likely to be one who had successfully worked at this machinery and therefore the service is poised even more confidently. Major programmes such as C-17, multi-role combat aircraft (MRCA), additional airborne warning and control system (AWACS), unmanned aerial vehicles (UAVs), Hawk Trainers and Su-30MKI, Air Defence upgradation, FGA, aircraft upgrades, etc seem to be moving well in the labyrinth. The LCA programme is likely to get a follow-on order. Other major indigenous programmes such as intermediate jet trainer (IJT) and light combat helicopter (LCH) are due for a boost. Tanker programme could be refreshed with the Navy also showing interest in the capability. The total programme is indeed enormous, next only to Chinese. It would be a challenging exercise to meet the payment schedule for new acquisitions and to meet the yearly schedule of payments towards ongoing deliveries. Besides operational systems, resources would be needed to acquire operational support facilities and systems such as airfield support, radars, training systems, logistics management system, communications, armament, etc. It is obvious that allocation and acquisition are highly planned activities and are meticulously monitored.

Military aviation as a whole has other important players as well. The Navy has an ambitious programme to induct maritime aircraft, next generation of combat aircraft, trainers, special role helicopters, UAVs and related support and training systems in addition to fleet modernisation that include surface ships and submarines. The Indian Army too is focused on expanding and modernising its aviation assets and has done their homework quite meticulously. The Coast Guard and Border Security Force have compulsions to improve their aviation and intelligence gathering assets to counter a repeat of 26/11 type of attack and to combat insurgency more effectively.

It is a complex exercise to sensibly distribute budget and resources over a plethora of aviation and non-aviation assets that the forces would require. Meeting proliferating demand for military aviation assets from a number of players is overseen by at least three independent ministries. This is a cumbersome process. The size of military aviation business would be defined by budgetary support available. The process entails detailed statement of necessity and budgetary support before approval at the designated level which is followed by identifying suitable vendors. Regrettably, the process to obtain approval is too long and the process to evolve a suitable system is too short. This leads to 'window-shopping'—of acquiring what is available within a tight time constraint.

Unless specifically authorised, the users do not reveal what they may need in the years to come except those that are being developed indigenously. This makes it extremely difficult for a potential vendor to anticipate request for information (RFI) until formally revealed. Development of military systems is generally clothed in secrecy. Hence, there is always a problem of what the military may need and what may be possible. However, in recent years, Indian Air Force did manage to procure operational systems evolved to meet their specific needs. More often, the military learns to adapt using sub-optimal systems that were developed for a different role, a different purpose and for a different environment. The adaptation included costly engineering modifications.

There is generally a lack of deeper understanding of technology by operational staff in terms of what is feasible and how this relates to cost and time. So far, the Indian military could tackle the adversaries who had nothing better in their hands, through sheer numbers that has now developed into a strategy. While a superiority of 3:1 was felt to be adequate to launch an offensive action, the demand today is for much more. Military history is full of examples. How a technically sophisticated and well-trained force could effectively neutralise a much larger force. In India, 'military elitism' is not developed systematically but assumed to be present in abundance. This approach would have to change if the military is serious about modernisation. Numbers must come down but the capability must improve exponentially.

Ideally, designer-vendor-operator understanding must be developed in a meaningful way. This would require institutional approach, duly funded. Technology institutions should run regular capsules to develop this understanding. The vendors would greatly benefit if they could invest in such an exercise to understand military requirement and possibly come up with more effective 'problem-solving'. Besides seminars or strategy, Indian military should hold workshops and joint programmes to understand technology application in war-fighting and solving military problems/situations. Ideally, the Indian military, Defence Research and Development Organisation (DRDO), institutions from India, and foreign technology leaders and friendly militaries should participate in such capsules. Such process could help in evolving greater professionalism and help to procure quality systems in a meaningful quantity. Most importantly, the common denominator should be cost and time against which efficiency should be measured. SP

We will be showcasing the second prototype of LCH during Aero India

PHOTOGRAPH: ABHISHEK / SP GUIDE PUBNS

Defence and aerospace behemoth the Hindustan Aeronautics Limited (HAL) has embarked upon a restructuring programme, in anticipation of the high volume of aerospace business that is to be generated in the next decade or so. New investments of over ₹10,000 crore are required in many Greenfield projects and HAL is bracing up for the competition. In a freewheeling interview with ***SP's Aviation***, the Chairman of HAL, **Ashok Nayak** was forthright about the status of Indian aerospace industry, the role the private sector can play, and HAL's achievements and the roadmap.

***SP's Aviation* (SP's): HAL's turnover in 2009-10 was about ₹11,500 crore and profit after tax ₹2,680 crore. What is the target for 2010-11 and are you on course?**
Ashok Nayak (Nayak): The target is ₹12,600 crore and we have been on track so far. We will be achieving the target with regard to both production and financials. HAL's performance has been improving and we will be showcasing the second prototype of the light combat helicopter (LCH) during the Aero India show in Bengaluru from February 9 to 13.

SP's: You have said that HAL's strategy is to go aggressive on exports, but there was a dip in export revenues from ₹430 crore in 2009 to ₹200 crore in 2010? What is it like for 2010-11?
Nayak: In 2009, we touched ₹430 crore boosted by the export of helicopters to Ecuador. The projection for 2011 is about ₹250 crore.

Ecuador lost one helicopter due to some operational exigency and there was bashing of HAL by the media. But Ecuador has confidence in the helicopter and they want to buy one replacement helicopter. What can be better than that. In future, Ecuador may order a few more helicopters. India is just getting into the export market for the first time with its own product. It is a long-drawn process. First, one has to get a foothold and then one should grab the handle. It is bound to grow. We are doing some projects worth about ₹250 crore as small work packages. The real spurt in exports will happen only when we sell our own products.

SP's: When is that likely to happen and will you be partnering with any other player?
Nayak: The growth in exports will happen in the next three to four years. Right now the number is small. In Ecuador it was seven helicopters of which two will be shipped out in March 2011. We are supporting Ecuador to maintain the fleet and our officials are there for better coordination. Warehousing and servicing by the local industry will be become viable only when the numbers are there.

SP's: Which are the markets you are looking at?
Nayak: We are primarily looking at Latin America where they are all praise for the helicopter. We will re-launch the marketing after Aero India. The new markets we are targeting include Columbia and Peru. Helicopters of HAL are in operation in Mauritius and Maldives.

SP's: What is HAL's order book and could you give domestic and international break-up?
Nayak: The order book is about ₹80,000 crore and it is mainly from the domestic market. We are still producing couple of Cheetah and Chetak helicopters for Suriname and Namibia.

SP's: There have been comments that the public sector undertakings (PSUs) have not paid back dividends to the desired extent?
Nayak: The dividends are there. HAL's share capital is around ₹120 crore and we have given over 100 times back to the government. The investment in PSUs has been a wise decision of the government in many strategic fields and all of these PSUs have outperformed.

As for desired results, it depends on one's perception. For instance, about 60 to 70 per cent of the fleet of the Indian Air Force (IAF) is supported by HAL. Some of the Russian big helicopters and huge transport aircraft are not supported by us. We are all looking for perfection and I know that there is room for improvement. And increasingly now, the equipment is becoming more and more complicated.

> Capacity expansion will not happen overnight. The existing infrastructure will not suffice for the new inductions including MMRCA.

SP's: The automotive industry has been given as an example of how it has succeeded?
Nayak: I know that of late the automotive and the aerospace industries are being compared. It is like comparing apples with oranges. Car is a car and an aircraft has thousands of parts which have to perform unfailingly and unceasingly. In the aircraft industry, our needs are small… for instance the requirement is for 126 Multi-Medium Role Combat Aircraft (MMRCA) but look at all the competitors. They would have produced substantial number of aircraft—F-16 is over 4,000 plus. All the licence agreement has been for domestic production here.

SP's: With doubling of aircraft production/acquisition there would capacity expansion, could you outline HAL's expansion plans?
Nayak: Capacity expansion will not happen overnight. The existing infrastructure will not suffice for the new inductions including MMRCA. We have to build infrastructure now for which we need massive investments and we are working in that direction. We will have to have a different factory for the light combat helicopter (LCH). So also, there is need for a new infrastructure for the light utility helicopter (LUH), which presently is on the design board. The first prototype is expected to fly in 2012 and the requirement is 187 units. In all, these Greenfield projects require investments of over ₹10,000 crore. We are looking at outsourcing substantial amount of work.

SP's: The Ministry of Defence is planning to facilitate level playing field for the private sector and the PSUs are expected to compete. What is your view on that?
Nayak: I think there is already level playing field. There are many major private players wanting to get into aerospace but they are not coming for small projects. We know what a struggle it is to make an aircraft. It is here we are at crossroads. However, smaller companies are performing better producing components. We buy the raw materials which may cost between ₹20-30 crore and give it to subcontractors to make components. The cost of manufacturing an aircraft, integration, engine, etc are prohibitive. Creating a test-bed for an engine is a major challenge.

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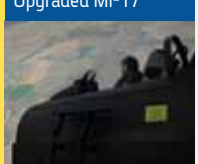

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SP's: With regard to MMRCA, which contender is the friendliest one to current infrastructure?
Nayak: The current infrastructure just cannot match. Each aircraft is different, accordingly infrastructure is created. Having dealt with Jaguar, Sukhoi 30 and other aircraft, we believe we can have an appreciation of something new.

SP's: On the fifth generation fighter aircraft (FGFA) what will be HAL's contribution?
Nayak: We have signed the contract for the preliminary design of the FGFA with Russia's Rosoboronexport and Sukhoi. It will involve the production of 200-250 aircraft. We are in the preliminary stages and the entire manufacturing will follow, led by HAL. And HAL on its own cannot do everything. We certainly need active involvement of the private industry.

SP's: Delayed deliveries of Hawk has affected training schedules of the IAF. Has HAL resolved delivery issues?
Nayak: We had some problems with equipment and tooling with BAE systems. It has been overcome. Hawk was well defined. Hopefully, the first batch of 42 aircraft will be completed in 2011-12. We have delivered 15 or 16 aircraft. We have had delays in certification of the advanced light helicopter (ALH). Now we are working on the Shakti engine and expect the process to be smooth. However, serviceability has been an issue with the Armed Forces. But we have made many changes and now serviceability is hovering around 60 to 70 per cent, far greater than sub 50 per cent we had. Next year, we will improve upon that. The Armed Forces have seen some change. There is no magic wand but we are at it continuously.

SP's: Could you give the progress on HTT-40 turboprop trainer aircraft?
Nayak: We have given the initial project reports to the IAF for necessary approval. The IAF and the Ministry of Defence are at it.

SP's: HAL has 10 joint ventures. Are there any more in the pipeline?
Nayak: Yes, there are a couple of them. We are having discussions with Rolls-Royce for another joint venture. The multi-role transport aircraft (MTA) is another which was incorporated in December 2010.

SP's: In the civil aviation sector, China is getting into 70-100 seat aircraft and trying to compete with the likes of Airbus and Boeing. What about India and what suggestion does HAL have to give?
Nayak: We have a national programme on regional transport aircraft (RTA) in the 70-90 seat categories. There is a high powered committee and India is trying to get into the league of civil aircraft. The natural corollary would be to go to the next phase of 120 to 150 seat category. But are China and India comparable… China has set up massive infrastructure. But we need to set up massive infrastructure like China has done before comparing ourselves with China.

> Customer satisfaction… we need to focus more on that. There have been teething problems with regard to ALH serviceability. Now we are having higher levels of resolution.

SP's: Hasn't Brazil shown the way with the success of Embraer?
Nayak: Brazil's model has been subcontracting outside. We are not doing that kind of work. We have vast resource base and we are looking at it from a national perspective.

SP's: How do you find Indian talent, the vast pool of engineers. Will they be able to absorb the technological evolution in the aerospace industry?
Nayak: We can definitely absorb. There is no doubt on that, probably the crunch is that not many are interested in blue collar jobs. More are interested in white collar, IT and other lucrative jobs.

SP's: You spoke about strategy, do we have a national aerospace commission?
Nayak: It is not that the country is not pursuing aerospace development. There may not be a formalised body like the Atomic Energy Commission or the Indian Space Research Organisation, but the aerospace industry is certainly growing. There is a roadmap to acquire better aviation capabilities.

SP's: Almost two years as Chairman, what have been the most significant milestones achieved and what are the ones you are working on?
Nayak: First, I cannot claim anything to be my own. In the aviation industry, it is team effort and happens over a period of time. Many projects which were started five to six years ago are fructifying now and it is a collective effort. However, there has been decent growth in sales, 10 per cent per year. There have been some new projects. We are doing fairly well as we have implemented the enterprise resource planning (ERP) system right across the company and this has improved efficiencies considerably.

SP's: What in your opinion needs attention?
Nayak: Customer satisfaction…we need to focus on that. There have been teething problems with regard to ALH serviceability. Now we are having higher levels of resolution. Whatever we promise, we must achieve within the time targets.

SP's: What is the outlook for 2011?
Nayak: I will be retiring. I want to go out a happy man. We had the first flight of LCH in March 2010 that is a culmination of tremendous efforts on everyone's part. Such instances make you happy. I believe that one should learn from ones past experiences.I won't call it mistakes. We had a number of issues with the ALH—on engine, transmission, etc, but whatever learning we had from ALH, the LCH programme will be a smoother one.

Air Chief Marshal F.H. Major
Former Chief of the Air Staff

All the stakeholders—the armed forces, public and private sectors—need to come together and grow in a symbiotic relationship to strengthen the nation and achieve self-reliance

Challenges & Dilemmas

THE DEFENCE MODERNISATION PROCESS of the Indian armed forces involves some very crucial technological and doctrinal challenges. The fundamental issue that always crops up when modernisation of the armed forces is discussed is—Does doctrine drive technology or it is the other way round? What it means is that do we conduct military operations with what we get or what is available or do we demand technology to facilitate the way we fight. Ideally it ought to be a doctrine that dictates the direction of research and development (R&D). A desired concept of operation or a perceived gap in capability is identified by military planners that require a technological solution. This in turn becomes the subject of design and development. A product is then designed, manufactured and inducted. But that's not how it usually happens. For this to happen, the country needs a very robust and indigenous technological base to develop core competencies in many complex technologies. Currently, our defence research, design and development is limited and is only adequate for licence manufacture and joint ventures. What is manufactured is only by defence public sector undertakings (DPSUs) with very little or no contribution from the private sector.

No nation can be a major power without three attributes:

- A high level of autonomous and innovative technological capability.

- A capacity to meet basic defence needs indigenously.
- Capability to project power (hard/soft) far beyond its borders.

This comes at a cost, and therefore, keeping costs to the nation in mind, the armed forces must seek cost-effective solutions to enhance their combat edge and technological superiority. Notwithstanding the perceived financial downturn, defence technologies are of an enduring nature and will continue to be in the forefront, since they are so deeply embedded and integral to our national security requirements, both in peace and war. The good news is that the environment for growth of defence industry in India is indeed very bright and conducive. The new government policy as laid down in DPP-2011permits offsets on defence contracts, to be utilised even in non-defence sectors. This leverage given to the aerospace sector would greatly benefit and encourage the private sector for greater participation. There is a demand and there is capability in the private sector—the ingredients necessary for catalysing growth.

Our nation has a large pool of immensely talented scientists and we need to leverage this resource for achieving self-reliance at the desired pace. Our armed forces seek to harness the capabilities of space, cyberspace, smart weapons and other cutting-edge technologies. These are areas, where opportunity beckons and the armed forces look forward to the best minds in the country taking up the challenge and providing them with breakthrough defence technologies. A very unique characteristic that exemplifies the nature of technology today is the rate of change. Shelf lives of existing technologies are becoming shorter and are being overtaken by newer technologies at a breath-taking pace. This has a direct implication in the modernisation process. The development cycle of a product from the design to operationalisation stage has to reduce; otherwise the equipment has the risk of becoming obsolete in its entirety. This certainly must not happen, given the security scenario which obtains in the neighbourhood. The question that now remains to be answered is what should be done? There is a need to identify core technologies that need to be developed and they must be aggressively designed and manufactured. If this is not done in time, we run the risk of being saddled with investments outside the country that do not add value to our existing state and deny us the opportunity to be self-reliant. There is a need to collectively bring focus into our design and development activities. We must not attempt to do everything. In the modern competitive environment, such a practice is simply not cost-effective and nations the world over are learning from the benefits of collaboration. We must therefore, identify zones of technology that need to be developed, and thereafter concentrate on these niche capabilities through joint ventures and partnerships.

There has to be a better and more effective way to focus research and design activities in the country. While the prevalent structures and organisations have served satisfactorily over the years and have brought the country to its present technological standard, it is time to evolve with the ever-changing requirements. Research, design, development and manufacturing activities in most other countries are undertaken by private industry in coordination with the user and the government. This is still not the case with us, and is mostly restricted to defence laboratories and public sector undertakings, who simply do not stick to time schedules, where manufacturing processes are outdated, capacities are inadequate, quality control is suspect and accountability is rarely enforced. Progressively, defence research design and development must move from the public to the private sector and into the capable minds and hands of young scientists and entrepreneurs. The concepts of time-bound processes, the ability to scrap a process if it does not meet the desired objective, the ability to take risks and timely decisions, are some truths that we could do well to absorb. As military technologies and hardware change, new capacities and capabilities are generated that sometimes radically alter the way we do business. And it is hard to do things differently with the old processes, interfaces and organisational structures that exist in our DPSUs and DRDO. Keeping pace and adapting to the changes as an organisation is the challenge. Another area of concern is the HR requirements of our DPSUs. Quality people are the most essential energisers. This is another weakness of ours. All stakeholders must have a deep, comprehensive, multi-disciplinary understanding. R&D needs the best people, world-class education and most importantly they need to be retained. Today, retention of organisational expertise is a major concern of our PSUs. The government must take suitable measures to attract people and make it worthwhile to stay.

Our nation has a large pool of immensely talented scientists and we need to leverage this resource for achieving self-reliance at the desired pace

The requirement to increase user interface in the design process is another crucial area. It exists to some extent but it has to take on a more intrusive and effective role. Industry should always be able to translate user requirements into viable technical options. The user must always remain the captain.

The last two decades of economic upswing have resulted in a comparative surge in the defence industry in our country. This is an encouraging sign but if unregulated, it runs the risk of wasteful expenditure and duplication of effort. There is, therefore, a definite need for an apex agency, to coordinate and regulate the activities of the many agencies involved in defence production.

There is no doubt that the Indian private sector has matured over the years and has a great role to play in association with research and development organisations and DPSUs to achieve a competitive edge in defence technology. All the stakeholders—the armed forces, public and private sectors—need to come together and grow in a symbiotic relationship to strengthen the nation and become self-reliant to meet the country's security needs. SP

Airlines in a THERMAL

Analysts have pointed out that airlines are in for a profit of $300 million in the fiscal year to March 2011, getting out of the red after two successive years of losses (combined losses of $2 billion). The capacity growth for the next financial year has been pegged between 12 and 13 per cent.

INDIA RECENTLY MADE COMMERCIAL aviation history. IndiGo, India's largest low-cost carrier (LCC) had just signed an memorandum of understanding (MoU) for 180 eco-efficient Airbus A320 aircraft of which 150 will be A320neo and 30 will be A320, a deal worth $15.6 billion (₹71,000 crore). It is the largest single firm order for large jets in commercial aviation history, and also makes IndiGo a launch customer for the A320neo.

"This order positions IndiGo to take full advantage of the predicted growth in Indian air travel," said John Leahy, Chief Operating Officer, Customers, Airbus. Indian air travel is a massive growth momentum, having recorded over 50 million domestic passengers in 2010. The Ministry of Civil Aviation has envisaged 280 million passengers by 2020, a phenomenal addition of 230 million passengers in a decade. The GDP growth rate is over 8.5 per cent and air traffic is set to grow nearly two times the GDP growth.

ACQUISITION: INDIGO HAS SIGNED A MoU FOR 180 A320 WITH AIRBUS

Not just Airbus, almost all the major commercial aircraft manufacturers are working hard to get their hands on the large aviation pie that exists in India. Airline traffic growth has been in double-digit and in 2010, airlines in India carried over 500 lakh passengers as against more than 400 lakhs in 2009, thereby registering a growth of nearly 19 per cent led by the LCCs which accounted for over 70 per cent of air traffic. The LCCs are going to be the drivers, connecting Tier-II and III cities as airport infrastructure is slowly coming in place.

Analysts have pointed out that airlines are in for a profit of $300 million (₹1,350 crore) in the fiscal year to March 2011, getting out of the red after two successive years of losses (combined losses of $2 billion). The capacity growth for the next financial year has been pegged between 12 and 13 per cent. "It's certainly a year of recovery. Everyone is now at a break-even or profitable," said Aditya Ghosh, President of IndiGo. Kapil Kaul of Centre for Asia Pacific Aviation (CAPA) forecasts higher growth and capacity shortage in 2011. Kalanithi Maran of the Sun TV group who has 31 per cent equity and is the Chairman of SpiceJet has said, "India is witnessing substantial growth, and predominant growth is expected from cities and industrial towns which remain underserved."

The road-ahead is clear—to connect new destinations.

The scheduled operators have an aircraft inventory of 419 and this is expected to go up substantially in the coming years if the airlines are looking at a pan-India presence. In November 2010, the Civil Aviation Ministry approved import/induction of 47 aircraft for both scheduled and non-scheduled operators. The Investment Commission of India has envisaged investment opportunities of $110 billion (₹4,95,000 crore) up to 2020 in the aviation sector with $80 billion (₹3,60,000 crore) towards new aircraft. SP

—R. Chandrakanth

PHOTOGRAPH: ANOOP KAMATH

CAE flight school initiatives in India growing to meet airline demand

IN ONLY THREE YEARS, CAE has rapidly established the leading independent aviation training presence in India with the capability to train hundreds of ab initio cadets and thousands of airline pilots annually. Company-managed pilot academies in Gondia and Rai Bareilly cater to young people aspiring to aviation careers. Then, with their commercial pilot licence (CPL) in hand, cadets progress to type-rating training, provided at the new CAE Training Centre near Bengaluru and other training centres worldwide. The result is a cadre of highly qualified pilots to address the growing crew needs of airlines in India and the region.

The campuses at Gondia and Rai Bareilly are part of the CAE Global Academy, the world's largest network of airline-focused flight schools. Other CAE Global Academy locations are in Africa, Australia, Europe, Malaysia and North America. Overall, the 11 members of the CAE Global Academy have the capacity to train nearly 2,000 cadets each year.

SHOWN HERE IS THE ADMINISTRATION BUILDING AT THE NEW CAE GLOBAL ACADEMY CAMPUS AT GONDIA, INDIA

CAE Global Academy Gondia, also known as the National Flight Training Institute (NFTI), is a joint venture between the Airports Authority of India (AAI) and CAE. It features a completely new campus with state-of-the-art classrooms, flight simulation training devices, glass-cockpit aircraft and comfortable accommodations. Indeed, the facilities were designed by CAE experts to optimize learning effectiveness in balance with the students' well-being. In November, a new sports complex was inaugurated with a traditional Indian blessing ceremony. The sports complex includes a fitness and weight room, squash court, table tennis room and billiards salon.

Announced in February 2008 and initially approved for operations by the Directorate General of Civil Aviation (DCGA) in February 2009, CAE Global Academy, Gondia, will honour its first three graduating classes at a formal inauguration of the campus on February 9.

The first Gondia cadet to be hired by an airline, Shivani Reddy from Chennai, obtained her Boeing 737NG type rating at Emirates-CAE Flight Training in Dubai, and is now a pilot with SpiceJet. "I always dreamed of becoming a pilot, and the training I received prepared me well," Ms. Reddy said. Other members of the initial class are being interviewed by various airlines such as IndiGo and Jet Airways or are pursuing type ratings.

Prospective cadets are required to take a screening exam which uses the CAE Aircrew Selection System -- a multidisciplinary, unbiased and equitable process designed to evaluate a candidate's "thinking and doing" capabilities in a contextual aviation environment and under stress. Examinations are conducted in Bengaluru and Delhi, as well as Gondia.

CAE Global Academy, Gondia, has a capacity for 200 students per year, and typically introduces a new class every other month for the 14-month programme. Cadets are self-sponsored; however, CAE's reputation for global best practices and the highest-quality training have led to keen interest from hiring managers for airlines such as IndiGo, Qatar Airways, and others.

CAE Global Academy, Rai Bareilly, perhaps better known as the Indira Gandhi Rashtriya Uran Akademi (IGURA), is managed by CAE for the Ministry of Civil Aviation. The flight school will celebrate its silver jubilee anniversary in September. Since 1986, IGRUA has recorded close to 1.4 million hours of flying. CAE Global Academy in Rai Bareilly has a capacity for up to 300 students each year.

The IGURA campus at Fursatganj Airfield in Rai Bareilly uses CAE's training curriculum, courseware and innovative training methodologies. CAE manages all flight school activities, including student and staff facilities, flying operations, air traffic control, aircraft maintenance, upkeep of the 1,722-metre runway, navigation aids and security, even fire-fighting facilities.

"CAE's core focus is on training highly skilled aviation professionals," said Walter Visser, Vice President, CAE Global Academy, who is responsible for management of CAE's global network of flight training organisations (FTOs) and airline pilot provisioning service. "We have more experience and expertise than anyone else in the world in training aviation professionals in every segment—commercial, business, general, and military aviation."

Up to 1,000 commercial airline pilots can train annually at the first independent commercial aviation training centre in India—CAE's training centre at Bengaluru. CAE began providing type-rating pilot training about two years ago for Kingfisher Airlines, IndiGo, SpiceJet, GoAir, Indian Air Force, and other customers. Located near the Bengalaru International Airport at Devanahalli, the facility features Level D full-flight simulators for the Airbus A320 and Boeing 737 aircraft. SP

Still A FAR CRY

GENERAL AVIATION: SAPL'S FBO AT IGIA

THE TERM FIXED BASE OPERATOR (FBO) originated in the US when in 1926, the Air Commerce Act made a distinction between travelling support teams who moved with adventurous post-World War I pilots through their barnstorming jaunts, and organised service providers who had their feet on the ground at one airport (and were thus "fixed"). Since then the concept has been refined and FAA defines it as "a commercial business granted the right by the airport sponsor to operate on an airport and provide aeronautical services such as fuelling, hangaring, tie-down and parking, aircraft rental, aircraft maintenance, flight instruction, etc." The concept relates to general aviation as airlines have their own organisations to provide these services. The US has 5,245 listed FBOs.

In India, the term FBO tends to be used loosely. It is common to see small, single service providers and handlers referred to as FBOs. Thus any service provider in the areas of passenger and/or cargo handling, refuelling, ground handling, engineering support, flight clearances, customs and immigration facilitation, etc, at a particular airport could be called an FBO—even if the service provided was just one of the above. The term is also used to denote a single omnibus agency providing ground handling, engineering (including refuelling) support, and handling of the flight through customs, immigration and security formalities with the departing passenger's hand being held through his transit from the landside to the airside and up to the aircraft door (and through the reverse path on arrival). Thus when in June 2010, it was announced that Shaurya Aeronautics Private Limited (SAPL) was being designated as the FBO for the Indira Gandhi International Airport (IGIA) Terminal in Delhi for general aviation, the apprehension amongst general aviation operators was that they would be coerced into taking engineering, ground handling and passenger handling services from SAPL. However, there was strong resistance to the idea of total abdication to SAPL, and the final dispensation in place is that SAPL only does the handling—leaving engineering and ground handling options to the client.

> The decision to make all general aviation operators to compulsorily use handling services provided by SAPL was perceived as being unfair because many of the operators are quite capable of handling their flights themselves, and indeed, have been doing so for long

One of the reasons for the FBO concept being unpopular in India is the manner in which it is being thrust down the throat of the general aviation operators. As an illustration, DIAL's decision to make all general aviation operators to compulsorily use handling services provided by SAPL was perceived as being unfair because many of the operators are quite capable of handling their flights themselves, and indeed, have been doing so for long. Moreover, the decision militates with the spirit of Competition Act 2002 (which replaced the Monopolies and Restrictive Trade Practices Act, 1969 in 2009). However, the single option FBO in Delhi is in line with the new ground handling policy which is being pushed down the unwilling throats of airlines for their operations in metros where one, two or three options have been provided and airlines told that they cannot carry out self-handling of their flights—something they have been doing efficiently for years. The Airports Economic Regulatory Authority Act of 2008 has not helped assuage misgivings in the airlines and general aviation operators about avaricious airport operators thrusting monopolistic or oligopolistic handling options on aircraft operators at their airports.

A utopian FBO scenario is where the airport operator enters into arrangements with more than one service providers to make available their services at competitive and attractive costs to the aircraft operators. The option of self-handling could also be left open to the operators. Under such a state of affairs, if the operators decide to give up self-handling and go for FBOs, the concept of FBO would have come of age. SP

—Group Captain (Retd) A.K. Sachdev

PHOTOGRAPH: NEETU DHULIA / SP GUIDE PUBNS

PACKING A PUNCH

For pilots, flight crew and maintenance staff, aero engine is the heart of the plane, to be diligently studied and lovingly handled, their every parameter carefully monitored and the slightest sign of distress investigated without delay

OIL IS BACK IN focus after a brief lull. The International Energy Agency recently warned, "Oil prices are entering a dangerous zone for the global economy. This is a wake-up call to the oil-consuming countries and to the oil producers." What about the transportation industry, especially aviation, so heavily dependent on oil to keep its powerful engines humming?

Most passengers know little about aero engines—except that they lie hidden in nacelles and make a big noise. For pilots, flight crew and maintenance staff, they are the heart of the plane, to be diligently studied and lovingly handled, their every parameter carefully monitored, the slightest sign of distress investigated without delay.

Last November, a Qantas A380 suffered a near-disastrous uncontained engine failure making the Rolls-Royce Trent 972 engine a household name. Fortunately, for other customers awaiting the Airbus A380 (Kingfisher Airlines has five on order) it also comes with Engine Alliance's GP7270 variant. Indeed, it's the fashion to offer customers two or more options on engines. And designers are obsessed with constantly improving engine safety and reliability besides coaxing out the last bit of fuel-efficiency, saving every drop of oil. This mollifies the environmentalists somewhat.

POWER-PACKED: PW4000 ADVANTAGE70- ENGINE

What made waves worldwide was last month's tentative order by LCC IndiGo for 150 Airbus A320 jets with more fuel-efficient advanced turbofan engines. The A320neo actually has two options—Pratt & Whitney's (P&W) PurePower PW1100G geared turbofan (GTF) engine or the Leap-X from CFM International. P&W's 1100G technology is new, its geared architecture allowing the front fan to spin three times slower than the core, which optimises the speed of each section of the engine. The Leap-X builds on existing technology with a two-stage high-pressure turbine driving a 10-stage high pressure compressor; its low-pressure turbine blades are produced using ceramic matrix composite. Airbus claims either engine should yield a 15 per cent improvement in fuel savings—good news for IndiGo whether it sticks to the tried and tested CFM offering or takes a leap of faith with the GTF. IndiGo's 39 existing A320-200s (+61 on order) are powered by International Aero Engines (IAE) V2500 power-plants. Kingfisher too has 23 A320-200s, with 67 on order, powered by the same engines. Ultimately around 4,000 A320neo airliners may be built over the next 15 years, so although IndiGo's planes are scheduled for delivery only from 2016 onwards, the favoured engine manufacturer will have first-mover advantage. A320s will continue to be available with the existing CFM56-5B or IAE V2500 engines.

India's market leader Jet Airways operates 55 Boeing B737NG jets powered by CFM International's CFM56-7B series. Nearly 7,000 CFM56-7B engines are in service on B737s, making it the most popular engine/aircraft combination in commercial aviation. While LCC SpiceJet flies 26 B737NGs (+33 on order), Air India Express operates 21. The other Boeing insignificant numbers is the B777—Air India has 20 and Jet Airways has 10—with General Electric GE90-115B1 engines. Air India's long-standing order for 27 Boeing 787-8 jets may be met beginning this year-end. The Dreamliner features two fuel-saving options—General Electric GEnx or Rolls-Royce Trent 1000. Of the turboprops, the ATR-72 with its twin P&W PW127F engines is the most common in Indian skies.

The long-running saga of finding an engine for India's own LCA Tejas finally came to an end in October. General Electric won the bid to supply 99 GE F-414 afterburning turbofan engines for the Tejas Mk II, beating Europe's Eurojet Turbo GmbH, which had offered its EJ-200. In the bargain, the unimpressive GTRE GTX-35VS Kaveri has been shelved; but its Mk II version could emerge with a little help from Snecma? SP

—Group Captain (Retd) Joseph Noronha, Goa

PHOTOGRAPH: PRATT & WHITNEY

TO DOUBLE IN 5 YEARS

If the Ministry of Civil Aviation awakens to the infrastructural needs of the helicopter section of the civil aviation industry in India, the total number of helicopters engaged in multifarious and indispensable roles in the service of the nation could double in the next five years in pursuit of the existing demand

INDUSTRY ESTIMATES: ABOUT 90 MORE HELICOPTERS WILL BE ADDED BY 2013

THE FIRST COMMERCIAL FLIGHT in Indian aviation history was flown in 1953 in a Hiller UH12B at Mumbai, and the first Indian Air Force (IAF) one in a Sikorsky S-55 the next year. Almost six decades later, while the IAF has graduated on to the best, the heaviest and the fiercest of the world's helicopters, civil use of helicopters is unimpressive. This is despite the plentiful opportunity that India's vast expanses of hostile terrain offer in terms of "helicopter territory" i.e. terrain where air travel is necessary but the terrain does not permit construction of airports.

According to the DGCA official website, the total number of helicopters bearing civil registration is only 288 as compared to 1,122 fixed-wing aircraft. This is so despite the broad range of roles that helicopters fly in today within India. The first need for helicopters is where airports are not feasible; this is especially (but not exclusively) applicable to mountainous terrain. Then there is intra-city mobility—the increasing trend of new Greenfield airports coming up far away from the cities they are intended to serve is popularising the concept of intra-city helicopter movements. Movements of VVIPs/VIPs when not being performed by military helicopters is another role for the rotary-wing craft as is related security and policing duties. Then of course there is medical evacuation —a concept yet to really take off in India as seriously as in other advanced countries. The day is not far off when we will have a company with medical evacuation as its only business. Disasters and emergencies also have their own demands to make for helicopter operations. Helicopters have also been used for crop spraying, fire fighting, dropping food and supplies to unreachable areas, search and rescue, high sea operations (ships, oil rigs, and islands) and tourism-related flights. Another growth area is use of these specialised ubiquitous machines by highway patrols and news gathering agencies.

Of the 121 non-scheduled operator permit holders in India, 57 have at least one helicopter on their strength. According to industry estimates, about 90 more helicopters could be added to the current 288 by 2013. However, the existing infrastructure in India to support rotary wing operations is infirm. There are no heliports of any importance, MRO facilities are scanty and the Civil Aviation Ministry and DGCA have not really applied themselves to the task of nurturing national rotary-wing might. Existing regulations, that tend to equate flexible helicopters with their fixed wing counterparts, have also led to inadequate exploitation of the flexibility and advantages of these wonderful machines. Perhaps the weakest area in this context is the lack of training facilities for rotary-wing flying. There is only one operational rotary-wing training institution—the HAL Rotary Wing Academy—which mainly serves the requirements of the Army and BSF and produces a handful of graduates annually. There is only one real simulator for helicopters in India—the Helicopter Academy to Train by Simulation of Flying (HATSOFF), which is currently configured for Bell 412 capability but will get Dhruv capability in the next few months. There are some plans in the background for new training facilities and simulators but they will take time to come to fruition.

The helicopter represents an aerial capability that in some flight operational regimes goes beyond the physical capabilities of the fixed-wing aircraft. If the Ministry of Civil Aviation (MoCA) awakens to the infrastructural needs of the helicopter section of the civil aviation industry in India, the total number of helicopters engaged in multifarious and indispensable roles in the service of the nation could double in the next five years in pursuit of the existing demand. SP

—Group Captain (Retd) A.K. Sachdev

PHOTOGRAPH: ABHISHEK / SP GUIDE PUBNS

SKIES BRIGHTENING

According to the Business Aviation Association of India, the country's current tally of approximately 550 private aircraft of all types is poised to swell to over 1,400 in the next five years

By **Joseph Noronha, Goa**

BUSINESS AVIATION THRIVES IN good times—that's when companies happily buy aircraft. The World Bank's latest estimate puts India's GDP growth at 8.4 per cent this year, which would accelerate to 8.7 per cent in 2012, overtaking China in the process and becoming the world's fastest growing economy. By 2020, India should be the world's third largest economy, smaller only than China and USA. It will surely be a highly attractive market for business aircraft. The country's current tally of approximately 550 private aircraft of all types (including helicopters) is poised to swell to over 1,400 in the next five years, according to the Business Aviation Association of India (BAAI).

The "rich list" is another definite indicator of the growth of business aviation—rich people account for around 10-20 per cent of new sales. Last year's report by Capgemini and Merrill Lynch Wealth Management presented a cheery picture of the number of high net worth individuals (HNWIs) in India with minimum investable assets of $1 million (₹4.5 crore). Their number grew up to 51 per cent in 2009 i.e. 1,26,700 individuals. Since then, the stock market has soared and individual wealth has grown. So this year's report should show another significant surge. According to Forbes India, there are already 69 billionaires in the country—prime candidates for one or more aircraft.

Even infrastructure, long the bugbear of business aviation, is looking up. Delhi has a new fixed base operations (FBO) terminal run by Shaurya Aeronautics. Last September, the GA terminal at Mumbai's CSI airport was certified as ready to start international operations. The Airports Authority of India aims to shift private aircraft operations to a refurbished Juhu—a measure to decongest Mumbai. At the same time, smaller airports like Chandigarh, Davangere, Imphal, Lucknow, Patiala, Puducherry, Sagar and Vadodara are gradually attracting corporate aircraft. Whether it's the lower charges or avoiding the hassles of operating from a highly congested metro, or the sheer joy of locating at a small airport where everybody knows everybody, it's a welcome trend.

RICH MACHINES: GULFSTREAM'S G450 (TOP), DASSALUT FALCON 7X (ABOVE)

Indeed, the indicators for India's business aviation industry have never been better. Gulfstream's Roger Sperry says, "We are very optimistic about India. We have good business here as India is an expanding market." Dassault Falcon's John Rosanvallon says, "India has become one of our strongest markets in the last few years." Hawker Beechcraft's Justin Firestone says, "India is a growing market for business aviation and especially Hawker Beechcraft." Cessna's Todd Duhnke says, "We believe there's potential growth in the area for the entire line of Cessna products as this region continues to embrace the advantages of general aviation." Likewise, Bombardier's Avid Dixon says, "India represents a tremendous opportunity for business aviation." There's demand for every model from small piston trainers to turboprops, large jets and even future supersonic jets. Recent business jet buys range from Embraer's entry-level Phenom 100 (last year's best-seller with 100 deliveries worldwide) to Gulfstream's ultra-long range G550 and Dassault's Falcon 7X.

A pretty picture, but what about party poopers? "Business aviation gets the stepchild treatment to civil aviation," complains Captain Karan Singh, BAAI's Vice President. Changes in policy, lower fuel tax, significantly enhanced infrastructure—the wish list is long. Establishing FBOs across the country is the need of the hour. High import taxes on aircraft and even higher import duties on spare parts, tools and equipment act as a definite disincentive. Everything will fall into place once the Indian Government is truly convinced of the utility of business aviation as a tool to enhance productivity and spur the economy, and acts on that conviction. At present there's plenty of lip service but nothing else. SP

PHOTOGRAPHS: ABHISHEK / SP GUIDE PUBNS

The more you train in peace, the less you bleed in war

Air Marshal Dhiraj Kukreja assumed the appointment of Air Officer Commanding-in-Chief, Training Command, Indian Air Force (IAF) on December 1 last year. Having flown both jet fighters and modern transport aircraft, the Air Marshal brings with him vast experience in operations and training. He has held a variety of command and staff appointments in the IAF and has undergone prestigious courses both in India and abroad. Training Command could not have a better person than him at the helm of affairs especially when it is on a threshold of major revamp. The AOC-in-C in a candid conversation with Air Marshal (Retd) B.K. Pandey of *SP's Aviation*.

***SP's Aviation* (SP's): The basic trainer HPT32 fleet remains grounded since mid-2009. What if any, are the plans for its revival and in what timeframe?**
Air Marshal Dhiraj Kukreja (AOC-in-C): The HPT-32 was grounded in August 2009 after an unfortunate accident. Since then the IAF and HAL have been working together towards finding a solution. A high-powered team was constituted under an Air Vice Marshal to study the problems on the aircraft and recommend solutions. Based on the study, some modifications have been carried out on a few aircraft and the trials too are almost complete. One of the modifications recommended, fitment of the aircraft parachute recovery system (APRS), is yet to be commenced. We are hopeful that the aircraft would be available for training flying in another six months or so.

SP's: Now that trials for the new basic Turboprop trainer have been completed, when do you expect the final selection to be made and what are the plans for its induction?
AOC-in-C: The IAF is working towards having the contract signed by March 2011. The induction of the first batch of 12 aircraft is expected within 18 months of signing the contract.

SP's: How exactly is the selection and induction of the new basic Turboprop trainer being coordinated with HAL? Will HAL undertake production of the selected aircraft or develop their own design?
AOC-in-C: The five vendors have submitted their proposals to Air Headquarters for transfer of technology (ToT) as a mandatory part of the RFP. The vendors have also visited HAL. HAL, however, would be involved only in the overhaul of the aircraft and not its manufacture as it is going ahead with its own design and production of the indigenous basic trainer aircraft called the HTT-40. The DPR submitted by HAL is under examination at Air HQ.

SP's: Have the issues pertaining to the Hawk advanced jet trainer been resolved with the OEM and the HAL? In what timeframe is the current order expected to be completed?
AOC-in-C: A total of 66 aircraft were first contracted of which 24 'direct supply' by the OEM have been delivered. Of the balance 42 aircraft that were to be licence-built by HAL and delivered by now, only 16 have been delivered. The HAL production is behind schedule. There are no pending issues with the OEM and the aircraft is flying well with the IAF.

PHOTOGRAPHS: BAE SYSTEMS & ABHISHEK / SP GUIDE PUBNS

SP's: There are concerns that despite the difficulties experienced with the initial order for the Hawk and RFI floated for fresh tender, follow on orders have been placed with the same company. How do you view this step?
AOC-in-C: The Hawk is a proven advanced jet trainer. After resolving the teething problems post its induction in the IAF in 2008, training flying is progressing well on the Hawk. The follow-on order has been placed keeping in mind the future increased intake of fighter pilots into the IAF.

SP's: Have there been any issues between BIAL and Air Force Station Yelahanka with regard to air traffic management since BIAL has been commissioned? What would be the impact on operations at Air Force Station Yelahanka after the second runway is made operational?
AOC-in-C: An SOP is in place for the 'flexi use of air space' as mutually agreed to between BIAL and the Air Force for operations ex-Yelahanka. It is working well. It would have to be reviewed prior to the second runway being operationalised. Use of one runway for departures and the second for arrivals may have to be thought of.

SP's: What are the plans for induction of the IJT to replace the ageing Kiran fleet especially on account of the substantially enhanced utilisation rate of the fleet after grounding of the HPT-32?
AOC-in-C: The IJT is to replace the Kiran aircraft by 2015. We are expecting the IOC by June this year. The first 12 aircraft will be inducted at the Flying Instructors' School at Tambaram. With further build up on numbers, pre-Hawk pilot training would also commence. We expect full training on the IJT by 2015.

SP's: In your view, is the infrastructure at Air Force Station Yelahanka adequate to meet the demands of an International Air Show such as Aero India especially as patronage of the expo has been growing substantially over the years?
AOC-in-C: Yes, definitely. Sufficient space is available for exhibitions and static display and viewing the air display. International class facilities are available for the public, the vendors and the media. Temporary structures are also erected to meet the growing needs. The infrastructure has definitely put Yelahanka on the international air show map.

SP's: What is the current status of the formation aerobatic team, Surya Kiran, and what are the plans for re-equipment of the team after the Kiran fleet is phased out?
AOC-in-C: The Surya Kiran Aerobatic Team will be performing at the Aero India and the team will continue to perform on occasions, but on specific clearance from Air Headquarters, as the aircraft are also being used to augment the training resources. We are examining the options available for a suitable replacement. None have been shortlisted as yet.


THE HAWK IS A PROVEN ADVANCED JET TRAINER


SURYA KIRAN ACROBATIC TEAM WILL PERFORM AT AERO INDIA 2011

SP's: With vast experience in both operations and training in the IAF, what are going to be your areas of focus while you are at the helm of affairs of the Training Command?
AOC-in-C: I have modified the old adage of sweating in peace. I have emphasised to my Commanders that "the more you train in peace, the less you bleed in war". Training is the foundation of any fighting force, more so of a technologically-oriented force such as ours. Our training has to be to be top class to ensure a firm foundation to our air warriors. Towards this end, quality of instruction imparted has to be par-excellence. Instructors have to keep abreast of the latest technologies and practices; infrastructure has to be improved especially where we are still operating from World War II vintage buildings. My emphasis is also on the trainer and the trainee i.e. the man. I have demanded highest standards from both in morals, values and ethics. It may be a tall order, but is essential. I am confident that the air warriors will respond. SP

MOST EARLY AVIATION RECORDS were set by pilots in the USA and Europe, with Indian aviators following much later. However, India had the honour of hosting the world's first official air mail flight. The memorable event happened exactly a century ago in February 1911. It was an international affair because the flight authorised by the Indian Government, took place in India on a British-built aircraft and the pilot was French. Henri Pequet, who was born on February 1, 1888, at Bracquemont, France, happened to be in the right place at the right time to make the momentous first flight.

Messages have been conveyed by "pigeon mail" for at least two millennia. A letter may be attached to a pigeon at a remote location and the pigeon set free—it flies straight back to its home where its owner can collect the missive. The ancient Romans, Greeks, Persians, and Chinese were well-versed in the use of homing pigeons to deliver important letters. A modern, regularly run pigeon-based mail service was conducted by New Zealand Pigeon Post from 1897-1901. Of course, there's the small matter of first conveying the pigeon to the originator of the message—generally in a cage.

Nowadays, "air mail" is usually understood as mail transported by aircraft. The first mail to be carried by an aircraft was on January 7, 1785, on a hot air balloon. Piloted by a Frenchman, Jean Pierre Blanchard, and an American, John Jeffries, the flight was made across the English Channel from Dover, England to the vicinity of Calais, France. Since then balloons (and later airships) were often used to convey mail. It took a few years from the introduction of the world's first powered aeroplane for air mail as we know it today to emerge. This is how it happened.

In early 1911, a great adventurer and sailor named Sir Walter Windham, was touring India with some aircraft and two European pilots (one of whom was Henri Pequet). While in Allahabad, the Vicar of the Holy Trinity Church met Windham with a request to help him raise funds for a new hostel for Indian students. Windham had the bright idea of raising some money by carrying mail with a special postmark by air across the River Ganga to Naini. He wanted it to be billed as the world's first aerial post. The Director General of Post Offices in India and the Postmaster General of UP readily approved the collection, cancellation and transport of mail aboard one of Windham's planes. The next step was to advertise the flight as widely as possible. A surcharge of six annas (37 paise today) was prescribed that would go entirely towards the students' hostel. Letters poured in from across India. They were sorted and marked with a unique cancellation stamp—"First Aerial Post, UP Exhibition, Allahabad, 1911". A special cancelling die had been cut in the postal workshop at Aligarh for the purpose. Finally, more than 6,100 pieces of mail arrived in time for the historic flight on February 18, 1911.

HENRI PEQUET
(1888 - 1974)

He began his aviation career as a balloonist, then joined the aircraft manufacturer, Voisin, in 1908, and made his first flight at Hamburg in 1909

It was a cold, clear morning. The mail sacks were loaded into the aircraft. Built by Humber, the biplane had been designed by an exhibition pilot named Roger Sommer and was a modification of an earlier Henri Farman design. It had a pusher propeller, powered by a 50-horsepower, seven-cylinder Gnome rotary engine mounted at the rear. Henri Pequet took off without any instruments except his wristwatch and an altimeter strapped to his left knee. He covered the eight km distance between Allahabad and Naini at an average height of 130 feet, cruising at a sedate 40-50 mph. The route took the aircraft over the heads of a million pilgrims bathing in the sacred Ganga during the festival of Maha Kumbh and so this may have been one of the most-witnessed early aviation feats. Landing at Naini, Pequet handed over the precious mail to the waiting postmaster and immediately flew back to Allahabad; round trip time 27 minutes. From Naini, the postmaster sent the mail by surface to destinations all over India and overseas.

Not much is known about Henri Pequet. He began his aviation career as a balloonist, then joined the aircraft manufacturer, Voisin, in 1908, and made his first flight at Hamburg in 1909. He earned his pilot's licence on June 10, 1910. During World War I, he was employed at Morane-Saulnier, where he later became the Chief Pilot. Before World War II, he was a Flight Instructor and Director of the airfield at Vichy-Rhue. He worked for the French resistance during the war but was captured by the Germans. After the war, he served as Director of the Vichy airport. Henri Pequet died on March 13, 1974, at Vichy, France. His name will always be associated with the world's first aerial post. SP

—Group Captain (Retd)
Joseph Noronha, Goa

MILITARY

Asia-Pacific

President awards Standard and Colours

The President of India and the Supreme Commander of the Indian Armed Forces, Pratibha Devi Singh Patil awarded the prestigious Presidential Standard to No. 31 Squadron and Colours to nine base repair depot (BRD) of the Indian Air Force (IAF), during a grand ceremonial parade held at Air Force Station, Lohegaon in Pune, on January 8, 2011. The Commanding Officer of No. 31 Squadron Wing Commander Ashutosh Srivastava received the Standard, while Air Officer Commanding of 9 BRD, Air Commodore B.R. Chandran received the Colours from the President. Both formations of IAF are based at Pune.

Americas

Royal Air Force crews to train at Offutt air base

Whether it's performing strategic bombing missions in World War II, defending Europe during the Cold War, monitoring Iraqi no-fly zones, or battling the Taliban in Afghanistan, the US Air Force and the UK Royal Air Force have been close allies for many years. Recently, this partnership was bolstered once again when an agreement was reached between the Department of Defence and the UK Ministry of Defence that allows the RAF to purchase three Boeing's RC-135V/W rivet joint aircraft over the next seven years. The aircraft is used for SIGINT. As part of this new agreement, the 55th Wing at Offutt Air Force Base was tasked to train the initial cadre of RAF aircrews. The Fightin' Fifty-Fifth has the Air Force's only operational RC-135 wing and is the sole provider of rivet joint initial qualification training. Once trained, the RAF crews will be allowed to fly on the US Rivet Joint aircraft, called co-manning, until the UK's RC-135 fleet reaches full operational capability.

Evaluation of Guardian anti-missile system on KC-135

Northrop Grumman Corporation and the Air National Guard have initiated modifications to a KC-135 air refuelling aircraft in preparation for the operational utility evaluation of the company's Guardian anti-missile system. The Guardian system incorporates the company's proven AN/AAQ-24(V) infrared countermeasures defensive aid system in a pod-based configuration. The AN/AAQ-24 is currently installed on over 500 fixed- and rotary-wing platforms for the US military, foreign heads of state and allied countries.

"The Guardian system is ideal for protecting legacy aircraft such as the KC-135. The pod is easily transferred from one aircraft to another in about 30 minutes, making IRCM protection a role-fit option, with fewer systems required to protect the fleet. There are currently more than 400 KC-135 aircraft in service as airborne refuelling platforms.

Lockheed Martin Next-Generation long-range surveillance radar

Lockheed Martin has successfully completed a capability demonstration in the latest phase of the US Air Force's development of the next-generation mobile, long-range surveillance and ballistic missile defence radar. The demonstration for the three-dimensional expeditionary long-range radar (3DELRR) was the second and final required under a $25 million, 20-month technology development contract awarded in May 2009. Lockheed Martin completed an initial demonstration of critical technology elements in March 2010 and an initial preliminary design review in October 2010. The 3DELRR will serve as the principal long-range, ground-based sensor for detecting, identifying, tracking, and reporting aircraft and missiles for the Air Force. The system will replace the Air Force's AN/TPS-75 air surveillance radar. The Marines also are evaluating the system as a replacement for their AN/TPS-59 ballistic missile defence radar.

Europe

New helmet to look, lock-on and fire

The 'helmet mounted symbology system' designed by BAE Systems, is a highly sophisticated helmet and support system that lets the pilot 'see' through the body of the aircraft, giving him a vital advantage when it comes to split-second decision-making. Using the new helmet system, the pilot can now look at multiple targets, lock-on to them, and then, by voice-command, prioritise them. It's a lightning-fast system to let the pilot look, lock-on, and fire. The pilot can even do

***Helicopters' Market**...Continued from page 26*

a $750 million (₹3,375 crore) tender to six aerospace majors, for fast-track, off-the-shelf purchases of 197 helicopters (133 for the Indian Army and 64 for the IAF). The offset obligation in this tender has been pitched at 50 per cent. Trials are under way and the contract is likely to be finalised soon.

Then, there is the case of VVIP helicopters which having weathered a stormy journey through the procurement procedure was finally cleared with the contract going to AgustaWestland for 12 AW101 helicopters for $770 million (₹3,465 crore).

But that is not all. The good news is the recent taking to the skies of the purely Indian light combat helicopter (LCH), which will surely stake its claim for induction into the services through the indigenous route. All in all, at close to $10 billion (₹45,000 crore), the rotary wing market for just the military helicopters presents a mouth-watering picture for helicopter manufacturers around the world. SP

—Air Marshal (Retd) V.K. Bhatia, Delhi

QuickRoundUp

AEROVIRONMENT

• AeroVironment's Global Observer unmanned aircraft system has successfully completed its first flight powered by the aircraft's hydrogen-fuelled propulsion system. The hydrogen-powered flight lasted four hours and reached an altitude of 5,000 feet. This milestone marks the beginning of high-altitude, long-endurance flight testing for the demonstration and operational utility phase of this joint capability technology demonstration programme.

AIRBUS

• European-based easyJet has signed a contract to buy a further 15 A320 aircraft and to convert an existing order for 20 Airbus A319s into the larger A320 model. The agreement is part of an order book which now totals 242 Airbus A320 Family aircraft, making easyJet one of the world's largest customers for this type.

India's largest low-cost carrier, IndiGo has signed a memorandum of understanding for 180 eco-efficient Airbus A320 aircraft of which 150 will be A320neos and 30 will be A320s. It is the largest single firm order number for large jets in commercial aviation history, and also makes IndiGo a launch customer for the A320neo. Engine selection will be announced by the airline at a later date.

ARIANESPACE

• Arianespace has signed over 300 launch service and solutions contracts and launched 289 satellites for 78 customers since 1980, more than half of all commercial satellites now in service worldwide. Arianespace continued its sustained launch rate in 2010, carrying out six Ariane 5 launches, along with one Soyuz launch, to orbit a total of 18 payloads. Arianespace is now actively preparing for the maiden launches of Soyuz and Vega from the Guiana Space Center in French Guiana.

BELL

• Bell-Boeing Joint Project Office has been awarded a $24.2 million (₹109 crore) cost-plus-fixed-fee delivery order against a previously issued basic ordering agreement which will provide engineering and technical support for management of the MV-22 and CV-22 Air Force variant flight control system

APPOINTMENTS

INDIAN AIR FORCE

With the retirement of Air Marshal N.V. Tyagi on January 31, the newly promoted Air Marshal R.K. Sharma has been elevated to the post of Deputy Chief of Air Staff (DCAS) with effect from February 1, 2011. He was holding the post of ACAS (Plans) at Air HQ prior to taking on the present assignment.

NORTHROP GRUMMAN

Northrop Grumman Corporation has named Karen Williams Vice President and General Manager of the Defense Technologies Division, one of four divisions within its Information Systems sector. The sector recently realigned its defence business to form the Defense Technologies Division, focused on end-to-end support systems and services for defence customers.

Northrop Grumman Corporation has appointed Graham Wright and Kathy Salyan to key leadership roles in the UK aimed at extending the company's intelligence-related business and strengthening the UK footprint for technologies and capabilities that are vitally important for national security. Wright and Salyan will focus on identifying new business opportunities and developing strategies to grow the UK business base for advanced cyber, integrated intelligence, intelligence surveillance, target acquisition and reconnaissance (ISTAR), geographic intelligence, space and environmental solutions and associated enabling technologies.

EUROCOPTER

Stéphane Chéry has joined Eurocopter to head the Group's International Media Relations beginning on February 1, 2011. He will now report directly to Cécile Vion-Lanctuit, who was appointed Vice President of Corporate Communications in May 2010.

BOEING

The Boeing Company has named Robert E. Verbeck, Chief Financial Officer (CFO) of its $34 billion (2009 revenues) Boeing Defense, Space & Security (BDS) business. He succeeds Randy Simons, who is retiring. Verbeck most recently served as CFO for the Boeing Military Aircraft business unit of BDS.

Boeing has named Kim Hammonds Chief Information Officer and Vice President of the company's Information Technology organisation. Hammonds, who was formerly Vice President of the Boeing Information Technology Infrastructure organisation, replaces John Hinshaw, who has been named Vice President and General Manager of Boeing's new Information Solutions division in Boeing Defense, Space & Security.

this when looking at targets over the shoulder—or at targets picked up by the radar which is directly underneath the floor of the aircraft.

Boeing C-17 for Royal Air Force arrives in UK

On January 21, Boeing and its Boeing Defence UK subsidiary announced the arrival of the Royal Air Force's seventh C-17 Globemaster III airlifter at RAF Brize Norton in Oxfordshire, England. The aircraft was officially delivered on November 16 last year from Boeing's facility in Long Beach, California, and underwent modifications at the company's San Antonio facility before flying to the United Kingdom.

Assigned to 99 Squadron at RAF Brize Norton, the UK fleet of C-17s provides critical airlift capability for the nation's Joint Rapid Reaction Force and has supported humanitarian and disaster-relief missions to Pakistan, Haiti and Chile. 99 Squadron's C-17s are equipped with upgraded software and avionics, as well as additional fuel tanks that extend the aircraft's nautical mile range to over 4,000 miles.

CIVIL AVIATION

Asia-Pacific

Plush new VIP lounge inaugurated

Bangalore International Airport Limited (BIAL) announced the inauguration of Bengaluru International Airport's new VIP Lounge by S.V. Ranganath, Chief Secretary, Government of Karnataka. Also present at the occasion were Dr G.V. Krishna Reddy, Vice-Chairman of the Board of BIAL, G.V. Sanjay Reddy, Managing Director of BIAL, Marcel Hungerbuehler, President, BIAL and other members of the BIAL Board. The new lounge, located on level 1 of the terminal, will cater exclusively to departing domestic and international dignitaries while the one located on the ground floor will service arriving dignitaries, ensuring a smooth and hassle free airport experience from their arrival at the terminal right up to flight boarding.

Europe

Estonian Air's first CRJ900 NextGen airliner

On January 24, Bombardier Aerospace delivered the first of three CRJ900 NextGen regional jets ordered by Estonian Air in 2010. The transaction included options on two additional CRJ900 NextGen aircraft. The handover to the Tallinn, Estonia-based airline was celebrated at Bombardier Aerospace's facility in Mirabel, Québec, where the CRJ900 NextGen

QuickRoundUp

and on-aircraft avionics software. Work is expected to be completed in December 2011.

BOEING

• CIT Group Inc. and Boeing have announced that CIT Aerospace has placed an order for 38 Next Generation 737 airplanes and purchase rights for seven additional 737s. The order, with deliveries into 2017, includes 15 737-900ER (extended range) and 23 737-800 airplanes. It is the largest order placed by a leasing company for the 737-900ER.

BOMBARDIER

• Bombardier Aerospace has confirmed that the US Federal Aviation Administration has awarded aircraft type certification approval to the 100-seat CRJ1000 NextGen regional jet. It has already been awarded certification by Transport Canada and European Aviation Safety Agency. The first two CRJ1000 NextGen jetliners were delivered to launch customers Air Nostrum of Valencia, Spain and Brit Air of Morlaix, France.

EADS

• EADS North American Defense, has been awarded a $52.5 million (₹236 crore) contract for 12 UH-72A Light Utility Helicopters, 12 Airborne Radio Communication systems and two Engine Inlet Barrier Filters. Estimated date of completion is April 30, 2012.

EUROCOPTER

• The Helicópteros do Brasil (Helibras) subsidiary of Eurocopter has signed a contract for a major upgradation programme on the Brazilian Army's fleet of 36 AS350 Ecureuils. This modernisation includes the rebuilding of three aircraft and its completion is expected in 2018.

FRENCH AIR FORCE

• French Defence Minister Alain Juppé has welcomed the order for 200 meteor missiles, long-range, air-to-air weapons that will equip the Rafale combat aircraft operated by the French Air Force and Naval Aviation. Meteor is a joint cooperative effort between France, Germany, Italy, Spain, Sweden and the United Kingdom. The first meteor missiles will be delivered to France in 2018. This future missile, fitted with a ramjet, is meant for air defence missions.

SHOW CALENDAR

9–13 February
AERO INDIA 2011
Air Force Station Yelahanka, Bengaluru, India
www.aeroindia.in/Main.aspx

21–23 February
INDIAN BUSINESS AVIATION EXPO (IBAE)
Hotel Shangri-La, New Delhi, India
www.miuevents.com/ibae2011

28 February – 2 March
MBAE-MEXICAN BUSINESS AVIATION EXHIBITION AND EXPO HELI MEX
Toluca Airport, Toluca, Mexico
www.mbaeexpo.com

1–3 March
23RD ANNUAL EUROPEAN AVIATION SAFETY SEMINAR (EASS) 2011
Conrad Istanbul Hotel, Istanbul, Turkey
http://flightsafety.org

5–8 March
HELI-EXPO 2011
Orange County Convention Center, International Drive, Orlando, USA
http://www.rotor.com

8–10 March
ASIAN AEROSPACE 2011
AsiaWorld-Expo, Hong Kong
www.asianaerospace.com

8–10 March
WORLD CARGO SYMPOSIUM 2011
Hilton Istanbul Hotel, Istanbul, Turkey
www.iata.org

8–10 March
INTER AIRPORT INDIA 2011
Bombay Exhibition Centre Goregaon East, Mumbai, India
www.interairportindia.com

21–23 March
AIR SURVEILLANCE AND RECONNAISSANCE 2011
America Square Conference Centre, London, UK
www.asarcevent.com

28–29 March
AIR POWER MIDDLE EAST 2011
Crowne Plaza Hotel, Muscat, Oman
www.meairpower.com

aircraft is manufactured alongside the CRJ700 NextGen and CRJ1000 NextGen regional jets.

INDUSTRY

Americas

Embraer's Phenom 100

Embraer's Phenom 100 entry level executive jet was number one, with 100 deliveries in 2010. Together with the other airplanes of Embraer Executive Jets' portfolio, the Phenom 100's success is also reflected in the company's increasing market share, which is the fastest growing in business aviation in terms of units delivered. There are ample grounds for the success of this top level executive jet. It can accommodate up to eight occupants and their bags in the roomiest cabin and baggage compartment of its class. The jet is also the fastest in its class and has a range of 1,178 nautical miles (2,182 kilometres), including NBAA IFR fuel reserves, which means, for example, that it is capable of flying nonstop from New York to Miami, in the US; from London to Rome, in Europe; or from Brisbane to Melbourne, in Australia. The fully integrated Prodigy avionics suite, exclusively developed for the Phenom jets, equips its highly intuitive cockpit.

GE and AVIC sign agreement for integrated avionics JV

GE Aviation of the United States and Aviation Industry Corporation of China (AVIC) announced on January 21 the signing of the agreement to form their new joint venture company. Chinese Commerce Minister Chen Deming and the US Commerce Secretary Gary Locke witnessed the public signing by David Joyce, president and CEO of GE Aviation and Zhang Xinguo, Vice President of AVIC in Chicago. The new AVIC and GE joint venture company will develop and market integrated, open architecture avionics systems to the global commercial aerospace industry for new aircraft platforms. This system will be the central information system and backbone of the airplane's networks and electronics and will host the airplane's avionics, maintenance and utility functions. GE and AVIC will continue to service their legacy programmes and existing contracts with customers. The agreement is subject to government approvals and the issuance of an operating licence.

Chinese approval of 200 Boeing aircraft

In January, Boeing received final approval from the Chinese Government confirming a $19 billion (₹85,500 crore) aircraft agreement. China's approval of airline contracts for 200 orders covers aircraft to be delivered over a three-year period between 2011 and 2013. The approval helps Boeing maintain and expand its market share in the world's fastest growing commercial aircraft market. Comprised of 737s and 777s, the agreement positively impacts more than 1,00,000 jobs including those at Boeing and with its thousands of suppliers throughout the US.

Gulfstream makes business aviation history

Gulfstream's test pilots and flight test engineers recently made business-aviation history when they flew the Gulfstream G650 flight-test aircraft for the first time using only an electrically powered, fly-by-wire backup flight-control actuation system. Gulfstream's Serial

QuickRoundUp

INTERNATIONAL LAUNCH SERVICES

• International Launch Services (ILS) and Satellites Mexicanos S.A. de C.V. (Satmex) have announced the launch of the Satmex 8 satellite on an ILS Proton. Satmex 8 is a high-power, 5,600 kg satellite with 24 C and 40 Ku-band transponders to replace Satmex 5. Located at the orbital location of 116.8 degrees West, Satmex 8 will provide Fixed Satellite Services to serve the continental US to Argentina as well as the Caribbean, all of Latin America and the major cities of Brazil.

IRAQ

• The recent arrival of three Bell T-407 training helicopters at Camp Taji will help train qualified Iraqi Army pilots to operate and maintain the helicopters, as well as rapidly accelerate the fielding and utilisation of Iraqi Armed 407 Armed Scout Helicopters which are scheduled to be fielded by the end of 2011.

ITALIAN AIR FORCE

• The upgrade contract of the 25 Tornado aircraft comprising 15 ECR version and 10 IDS version amounts to €96 million ($127.7 million), the majority of which is relevant to Alenia Aeronautica activities; this amount is in addition to the € 65 million ($86.5 million) already provided for the supply of the equipment and kits to be installed on the same aircraft. Contract "RET 8" for the upgrade was signed between the customer, NETMA, represented by the General Manager, and Panavia, represented by the Managing Director.

JOINT STRIKE FIGHTER

• Kongsberg has received an order for deliveries of rudders and vertical leading edges to the F-35 joint strike fighter. The order is for deliveries to 28 F-35s and is part of the framework agreement signed in July 2008.

LOCKHEED MARTIN

• Lockheed Martin Corporation, Maritime Systems and Sensors Tactical Systems, has been awarded a $47.5 million (₹214 crore) modification to a previously awarded firm-fixed-price contract for mission system spares required for the initial outfitting of new avionics components for 12 P-3C

Number (S/N) 6001 flew for a total of 3 hours 33 minutes on December 21, 2010. Typically, fly-by-wire uses a third hydraulic system to provide redundancy in the event of a dual hydraulic system failure. However, Gulfstream's fly-by-wire architecture uses electric backup hydraulic actuators (EBHA): electrically controlled actuators that are primarily hydraulically powered but offer electric power as a backup. A self-contained hydraulic reservoir and motor pump allow full operation should hydraulic loss occur.

Europe

Cassidian-Ericsson TETRA network

A consortium of Cassidian (new name of EADS Defence & Security) and Ericsson successfully completed the Schengen project for development of the TETRA radio network in Bulgaria. Following this latest extension, the secure radio communication network now includes a further 50 fixed and three mobile TETRA base stations. This has doubled the size of the network to 111 TETRA base stations. The Bulgarian public safety forces, particularly the national border police and fire brigades, will thus enjoy smooth, secure, digital radio communications across more than 80 per cent of Bulgaria's territory. Secure and reliable communication is one of the prerequisites for the successful undertaking of crisis operations by public safety forces. The TETRA radio network now used by the Bulgarian Government for communication and dispatching can also support numerous extremely useful data applications, which Cassidian demonstrated to the Bulgarian Ministry of Interior over the course of 2010.

A330 MRTT refuelling system

The Airbus Military A330 MRTT has successfully passed fuel to receiver aircraft using the fuselage refuelling unit (FRU) for the first time—meaning that all of the aircraft´s refuelling systems have now been demonstrated. In a three hour 10 minute sortie from Getafe near Madrid on January 21, the future strategic transport aircraft (FSTA) variant for the UK Royal Air Force conducted a series of "wet contacts" with two F-18 fighters of the Spanish Air Force. The FRU is a hose and drogue similar to those fitted under the wings, but with a higher rate of fuel transfer, and which is also developed and supplied by Cobham of the UK. The full complement of refuelling systems which can equip the A330 MRTT, and which have now all been demonstrated, consists of: the FRU, the underwing hose-and-drogue, and the Airbus Military aerial refuelling boom system (ARBS), plus the universal aerial refuelling receptacle slipway installation (UARRSI) used to receive fuel from another tanker.

1,00,000 flying hours for Eurofighter Typhoon

The operational fleet of Eurofighter Typhoons in service since the second half of 2003 achieved the impressive milestone of 1,00,000 flying hours in January 2011. To mark the occasion, a ceremony was organised at Eurofighter headquarters in Munich, Germany. At the event were senior representatives from the Eurofighter programme, Eurofighter management agency NETMA alongside senior staff from all six customer nations including those from the export customers Austria and the Kingdom of Saudi Arabia. The 1,00,000 hours were achieved flying the Typhoons in the bitter cold weather of the Baltic Sea, in the temperate climate of the Tyrrhenian Coast, in the torrid heat of the Arabic Peninsula and over the rough South Atlantic Sea. A range of operational scenarios have tested the Typhoon to its limits and is a testament to the reliability; operational readiness and the durability of the platform and systems under operational conditions.

ATR sold 80 new aircraft in 2010

European regional turboprop manufacturer ATR announced in January that it booked orders for 80 new aircraft in 2010, plus options for 33. ATR also generated a turnover of $1.35 billion (₹6,100 crore)—almost three times the turnover achieved in 2005. These results illustrate the first signs of recovery of the aviation industry in 2010. They enable ATR to prepare itself to reach its next significant step of growth from 2012 onwards: yearly deliveries around 70 aircraft and turnover reaching $1.8 billion (₹8,100 crore).

SPACE

Americas

Pratt & Whitney Rocketdyne boosts heavy-lift vehicle

On January 20, Pratt & Whitney Rocketdyne helped boost a government satellite for the US government, demonstrating its heavy-lift capabilities and continued support of national security. The satellite was onboard a United Launch Alliance Delta IV Heavy rocket, powered by three Pratt & Whitney Rocketdyne RS-68 booster engines and one upper-stage RL10B-2 engine. The Delta IV Heavy launched for the first time from Vandenberg Air Force Base in California, becoming the largest rocket ever launched from the West Coast.

The RS-68 is the world's largest hydrogen-fuelled engine, designed for heavy-lift with 7,58,000 pounds of vacuum thrust and 6,63,000 pounds of sea-level thrust. The RL10B-2 is a unique cryogenic upper-stage engine that provides 465 seconds of specific impulse and 24,750 pounds of thrust. ●

QuickRoundUp

aircraft for the government of Taiwan under the foreign military sales programme. Work is expected to be completed in December 2012.

POLAND

• Three new Mi-17 helicopters, out of the five purchased by the Poland's Ministry of National Defence have been delivered. These are meant to be deployed in Afghanistan as part of the 'Afghani package' dedicated to the operation in Afghanistan. Already the Polish Task Force in Afghanistan operates four Mi-17 helicopters and 8 Mi-24 assault helicopters. Newly acquired UAVs "Aerostar" are also being prepared for use.

PRATT & WHITNEY

• Pratt & Whitney has been awarded a $27,255 million (₹1,22,647 crore) contract modification to provide for 30 F117-PW-100 engines, spare engines, and associated data for the C-17 aircraft.

ROLLS-ROYCE

• Rolls-Royce Corporation has been awarded a $121.4 million (₹546 crore) modification to a previously awarded contract to exercise an option for the procurement of 58 AE1107C MV-22 engines. Works expected to be completed in April 2012.

RUSSIA

• Russia's Tu-204SM has performed its first test flight by being airborne for about an hour and the first flight test programme was successfully completed. Tu-204SM was designed by JSC Tupolev and is a modification of Tu-204 aircraft. Its flight duration is up to nine hours, flight range is about 4,000 km and it can carry 174 passengers in a two-class layout.

SAAB

• Defence and security company Saab has received an order from the Swedish Defence Material Administration, FMV, for the continuous support of Gripen's operational capacity. The order includes technical support, product maintenance, flight testing and running simulators to support the operational capacity of the Gripen system.

Bureaucratic Malaise

AS THE NEW YEAR DAWNED, the medium multi-role combat aircraft (MMRCA) tender for the Indian Air Force (IAF) was back in the news with a bang; but this time with an incredibly shocking piece of news that a file related to the subject marked as "secret" submitted by Air Headquarters to the Ministry of Defence (MoD), was found by a private security guard, lying on the road side in the Khel Gaon housing complex in Delhi. Apparently, the file had gone missing after it was received at the MoD. In an effort to mitigate sensationalism and unwarranted media hype associated with a serious security lapse such as this, the IAF Chief attempted to play down the importance of the file in question describing it as being a part file with only three or four enclosures dealing with some comments on the offsets proposal and had nothing to do with the aircraft tender as such. While the CAS was dismissive, the Ministry of Defence remained reticent. But the Defence Minister A.K. Antony took a more serious view of the security lapse expressing his concerns publicly. As expected, both Air Headquarters and the MoD ordered separate investigations into the incident.

Whatever the differing shades of opinion on the issue or the results of the investigations, the callousness evident in the handling of sensitive documents by the bureaucracy per se, is a sad commentary on the manner in which procurement of defence equipment is handled at the national level. It is also symbolic of the malaise that plagues specifically the $10 billion (₹45,000 crore) MMRCA tender. Request for information for procurement of 126 combat aircraft was initiated by Air Headquarters in 2001. The requirement was urgent as the MiG-21 fleet was obsolescent and the light combat aircraft Tejas, expected to replace the MiG- 21, was nowhere near achieving operational status. However, despite the urgency generated by the depleting combat potential of the Indian Air Force (IAF) and the critical importance of the proposal to national security, it took six years for the Ministry of Defence to take the next step and issue a formal request for proposal (RFP). While the delay would have been frustrating for the IAF, the MoD had a convenient precedent in the Hawk deal which took over two decades to fructify. The pace at which such "urgent" cases for the procurement of defence equipment are processed, reflects priorities in respect of national security. However, no amount of explanation to justify the inordinate delay can ever be convincing.

It took another two years before the MoD cleared the IAF to commence flight evaluation. Despite the six types of aircraft to be evaluated, the range of weapon systems and the different environments in which performance of the aircraft and its weapon systems had to be assessed; the IAF took just a year to complete the infinitely complex task. However, on account of the tardy progress in the procurement process, by this time, the validity of the commercial bids submitted initially by the vendors would have expired, necessitating submission of revised bids.

The incident involving a secret file lost and found comes at an awkward time. All the six contenders are reported to be neck-and-neck in the race which though moving forward at slower than snail's pace, has entered a stage wherein their offset proposals would be evaluated. The policy on offsets has itself been a subject of contention between the MoD and the vendors. As against the normal offset obligation of 30 per cent, in the case of the MMRCA tender, the level of offset has been pegged at 50 per cent. Despite the recent changes in the policy that permits offsets related investment in sectors other than military aerospace, some vendors may still find the 50 per cent level of offset extremely difficult if not impossible to cope with. Vendors are also inclined to be confused by the changes in the Defence Procurement Procedure (DPP) carried out annually, ostensibly to improve transparency. However, every such exercise only serves to further complicate the procurement procedure. In the instant case, the public will never know the contents of the file that was lost and found and hence none can accurately assess the quantum of sensitive information compromised in the embarrassing episode. However, at this juncture, mishandling of sensitive documents related to the contentious offset proposals by those responsible for processing the tender is likely to accentuate misgivings both amongst the public and the vendors as also impinge on the credibility of the procurement process itself.

It is evident that a lot remains to be done to make the processing of cases related to procurement of defence equipment, not only smart, efficient and credible, but also responsive to the demands of national security

It is evident that a lot remains to be done to make the processing of cases related to procurement of defence equipment, not only smart, efficient and credible, but also responsive to the demands of national security. SP

— Air Marshal (Retd) B.K. Pandey

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Safety: The only aircraft in its class certified to latest safety standards and meets the world highest airworthiness certification

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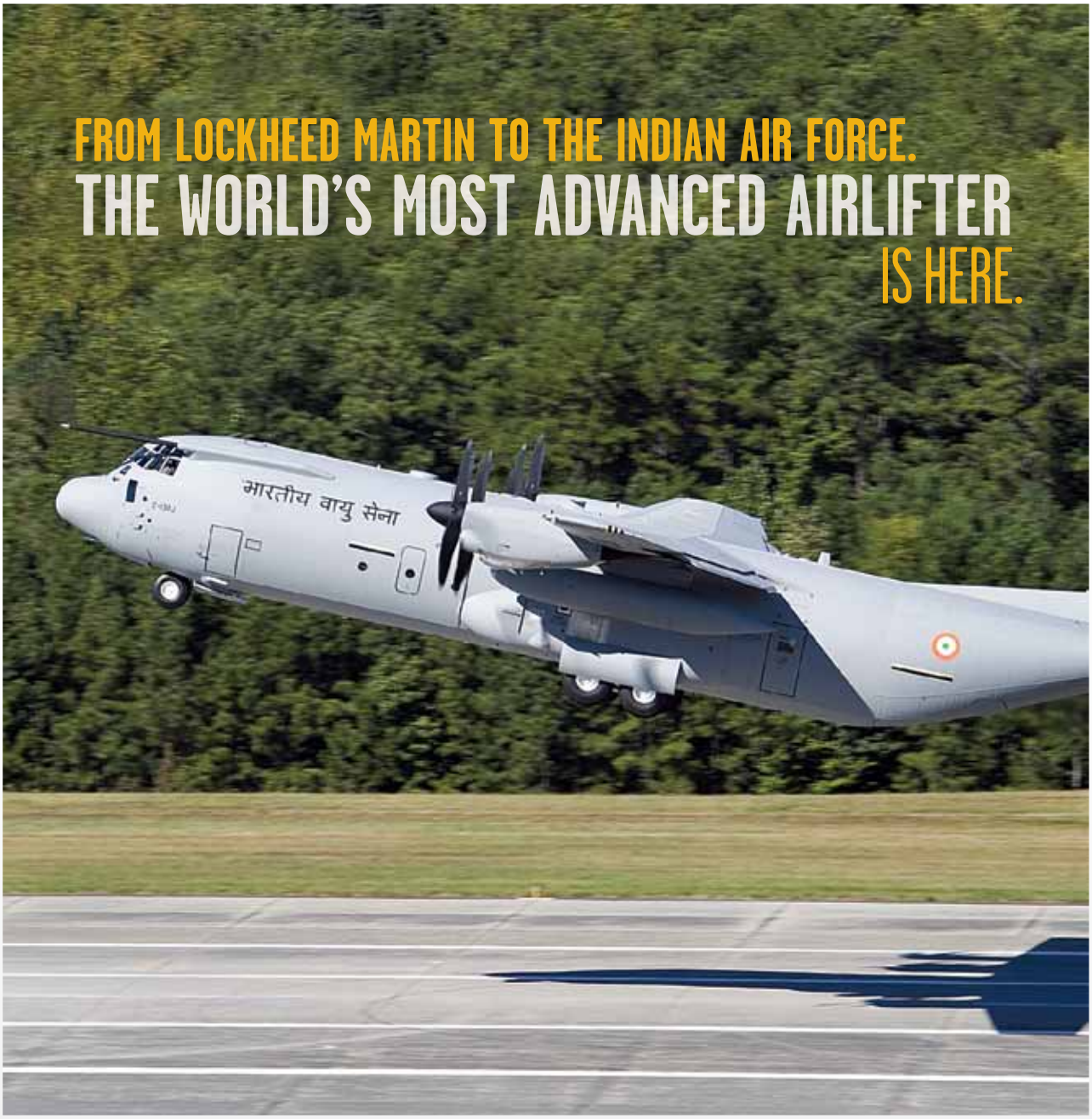

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