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ENGINE POWER

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Image By: Pratt & Whitney

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IAF has plans on the anvil for other acquisitions — additional C-130J aircraft and the C-17 deal cleared by the Cabinet Committee on Security—close to the MMRCA project in dollar terms

AFTER A SUCCESSFUL AERO INDIA event early this year, *SP's Aviation* is looking forward to the Paris Air Show commencing from June 20. The show at Le Bourget gains significance from an Indo-French perspective as efforts are on to further strengthen bilateral relationships between the two countries in many areas and most specifically in the realm of defence.

That French Dassault Rafale has made it to the 'finals' of the Indian Air Force's acquisition plans for 126 medium multi-role combat aircraft (MMRCA) along with the European consortium's Eurofighter Typhoon, edging out contenders from the US, Russia and Sweden, will be more than a talking point at Le Bourget. Both the 'finalists' are on campaigns to impress the Indian authorities. The French Defence Minister Gerard Longuet was in Delhi and was soon followed by the German Chancellor Angela Merkel. The campaign, we believe, will move to Paris and *SP's Aviation* team will be there to report and analyse from the ground. Air Marshal (Retd) V.K. Bhatia gives a fresh perspective on the MMRCA deal and also how there are various other market opportunities for global defence majors to tap. IAF has plans on the anvil for other acquisitions —additional C-130J aircraft from Lockheed Martin and also the Boeing's C-17 deal cleared by the Cabinet Committee on Security—close to the MMRCA project in dollar terms.

The June issue focuses on 'Emergence of FBOs in India' wherein we find that the aviation industry and general aviation in particular, has been clamouring for infrastructure facilities, including government push for setting up fixed-based operations. Sucheta Das Mohapatra and R. Chandrakanth in their article find that the industry has been strapped considerably for want of FBOs, while there has been a good deal of aircraft acquisitions in the general aviation sector. No doubt, the opportunities for opening FBOs in India exist, the fillip has to come from the government now.

On similar lines, in another article Chandrakanth dwells on how secondary markets in the civil aviation sector will play a decisive role in shaping airline business. Considering the growth in passenger movement from smaller towns to the metros, the concept of regional airlines is gaining cur-

rency and some players, SpiceJet for one, have plans to start operations soon. Here again, infrastructure facilities have to be commensurate with the growth projections and aspirations of the airlines and they have to be on 'fast-track' mode.

In the centenary year of Indian civil aviation, there have been several programmes to celebrate, to take stock and to look ahead. In the conference organised by ASSOCHAM and Ministry of Civil Aviation, there was tremendous enthusiasm on the sunrise sector, though airline representatives were not gung-ho about many regulations. The report on the conference highlights various perspectives on making the aviation industry grow in a healthy manner. Andrew Herdman of the Association of Asia Pacific Airlines (AAPA) calls for inputs from the emerging markets of Asia when it comes to international regulatory standards which currently is dictated by the US and Europe.

There are two features in this issue to do with engines, while Joseph Noronha looks at the strengths of large engines, there is an interview with Pratt & Whitney and how they are enthused with the IndiGo deal for 300 engines for Airbus A320neo.

Happy times, should we say. Nevertheless, happy reading !

Jayant Baranwal
Publisher & Editor-in-Chief

TERROR ATTACKS ON PAKISTAN

A group of heavily armed terrorists stormed a Pakistan Air Force (PAF) base Faisal, named after the late King Faisal of Saudi Arabia. The air base, situated 10 km from the Quaid-e-Azam International Airport in the port city of Karachi, was attacked at about 2230 hours on May 22, killing at least a dozen people and injuring several others. An adjacent naval facility PNS Mehran was also targeted where two navy planes were destroyed. The Pakistani Taliban, along with Al-Qaeda, has vowed to avenge the death of Osama bin Laden, who was killed in a US Special Forces operation in Abbottabad on May 2 this year. Reportedly claiming responsibility for the operation, the Pakistani Taliban have threatened to launch more attacks.

VIEWS

EVEN AS THE PAKISTANI military and the government were trying to grapple with the international embarrassment on account of the raid on Abbottabad by the US Special Forces, a handful of militants, believed to be from the Tehreek-e-Taliban Pakistan (TTP), or the Pakistani Taliban, mounted an audacious attack on a strategically important defence facility killing over a dozen personnel and destroying two four-engine P-3C Orion maritime reconnaissance aircraft of the Pakistan Navy.

While suicidal blasts in civilian locations have become a routine affair in Pakistan, attacks against military installations have been on the rise especially in the recent past. In an attack barely ten days ago, suicide bombers of the TTP killed over 90 recruits at a paramilitary training centre near Peshawar. Earlier in 2009, in an attack by a suicide squad of the TTP on Pakistani Army Headquarters in Rawalpindi, 23 people were killed. The attack on PNS Mehran was perhaps just as deadly.

The episode on May 22 wherein two P-3C maritime reconnaissance aircraft were targeted in the attack on PNS Mehran is of special significance. The Pakistan Navy is a part of the US-led international naval force which supports NATO operations in Afghanistan and plays an active role. This force, that has had a counter-terrorism role since the beginning of US operations in Afghanistan, is responsible for preventing hostile activity originating from the Gulf to the Indian Ocean which could hamper operations in Afghanistan. In April last year, reconnaissance capability of the Pakistani Navy both over land and sea, received a boost with the induction of two of the seven latest versions of P-3C Orion aircraft on order. The attack on PNS Mehran has certainly blunted the edge of a potent weapon system and eroded the capability of the Pakistani Navy to conduct anti-terrorist operations. While there is very little explicit collaboration between the Afghan Taliban and the TTP, both have a declared common enemy,

the USA and in its wake, the Pakistani military establishment. And given the resolve to avenge the death of Osama bin Laden, in all likelihood, there could have been inspiration from, if not direct involvement, of Al-Qaeda.

With the episode in question, Pakistan and its powerful military are confronted with a major dilemma of facing the enemy within. As in the case of the attack on Army Headquarters two years ago, here too there is a possibility of complicity by insiders in the Pakistan Navy without which penetration of a sensitive, heavily guarded facility may not have been possible.

There has been growing hostility in the nation including in the security forces over what is perceived to be a national sell out to the US whose forces operate freely in Pakistan unmindful of her sovereignty. But the situation in Pakistan today is that of its own making. Together with her mentor, the US, Pakistan has played a proactive role in creating monsters such as the Mujahideen, Osama bin Laden with his Al-Qaeda, Mullah Omar and the Taliban, all to serve their own immediate and narrow political ends. With the political objectives having been achieved, though not in Afghanistan, the monsters are now out of control and have turned inwards to haunt not only the two nations in question, but their relationship as well. And caught between the US and the militants, the people of Pakistan are paying a heavy price.

Although the plight of the Pakistan military has been the focus of debate, the precise role of the Inter-Services Intelligence (ISI) remains somewhat dubious and indistinct. Given the complex dynamics of the equation amongst the ISI, the Central Intelligence Agency (CIA), the various militant outfits and their not-so-honourable intentions towards India, one could wonder whether the May 22 episode was merely a 'live rehearsal' or an alibi for an attack on a similar Indian target that the Chief of ISI General Ahmed Suja Pasha has been bragging about in the recent past. SP

—Air Marshal (Retd) B.K. Pandey



PHOTOGRAPH: SCREEN SHOT FROM TV

EXERCISE VIJAYEE BHAVA

Manoeuvring columns of Army tanks and hovering helicopters in soaring temperatures of May in the desert terrain of northern Rajasthan near Suratgarh simulated an intense battlefield scenario in the joint Indian Army-Indian Air Force Exercise, code named 'Vijayee Bhava'. The month-long exercise of a simulated battlefield environment involving formations of the Indian Army's Western Command and the Indian Air Force's Western Air Command (WAC) was progressively built from the smallest unit upwards to the entirety of a Corps with matching IAF participation at each level that included many-faceted air operations such as offensive air defence, close air support and special airborne and heliborne operations.

VIEWS

THE JUST CONCLUDED JOINT land-air exercise Vijayee Bhava literally meaning 'blessed to win' couldn't have come at a more appropriate time, sending a clear-cut message from India to – at the drop of a hat – sabre-rattling western neighbour. Finding itself totally cornered having been exposed of its duplicity in the Osama bin Laden affair and helpless in the face of a mighty US taking unilateral action in eliminating the world's most dreaded terrorist; Pakistan – seething with impotent anger against the US violation of its so-called sovereignty – has turned its ire once again against India, threatening it with unmatched consequences for any similar action in rooting out India's most wanted terrorists hiding (or staying openly) in Pakistan with the blessings of its Establishment. India's military Chiefs may have merely hinted at having the necessary capability to execute such missions but the response from across the border has been like that of a hissing cobra which has been poked with a stick. It is for this belligerent neighbour, the Indian armed forces need to periodically send appropriate signals of their operational preparedness, deterring it to indulge in any military misadventures. The recent summer exercise, however, served more than just one purpose because of its nature and content.

It is known that the Indian Army, working on a 'capability based approach', has embarked on a series of transformational initiatives spanning concepts, organisational structures and absorption of new age technologies particularly in the fields of precision munitions, advance surveillance systems, space assets and network-centricity. The exercise was conducted for trial and evaluation of the new concepts and capabilities of the nominated test bed formations of Ambala-based 'Kharga' Strike Corps; the thrust of the transformational initiative being for the Army to emerge as a modern, lean, agile and enabled force. A concurrent aim of the exercise was to integrate the new concepts with that of the IAF which employing new tools and capabilities, has already moved ahead in its quest

for total transformation to fight the modern-day war.

On the ground, the exercise aimed at rapid mobilisation involving mechanised formations to check the dynamic processes of operations, both offensive and defensive, integrating concepts of modern warfare that have emerged during the transformation studies of the Indian Army. With the recognition of aerospace power playing a dominant and decisive role in future wars, all air assets were reportedly used in an integrated manner throughout the exercise.

The IAF elements involved in the exercise included MiG-29s, MiG-21 Bison and Jaguar jet fighters, IL-76, An-32 and Avro-748 transporters and Mi-17 1V, Chetaks and Mi-25/35 attack helicopters of Western Air Command. Offensive air defence was integral to the exercise that included interceptions in enemy territory. Nearly 100 fighter sorties were reportedly flown for simulated decimation of advancing enemy armour. Integration with the Air Force in all stages of planning and employment of airborne and heliborne Special Forces was another highlight of the exercise. Three hundred paratroopers and 50 dispatchers were air dropped from a formation of air transporters involving one IL-76 and six An-32 aircraft in night operations. In addition, the IAF pressed in Mi-17 1V utility helicopters for special heliborne operations (SHBO), including covert dropping of Special Forces behind simulated enemy lines.

"The success of any war would be based on total integration of air and land battle, and through this exercise we have tried to achieve this," said Lt General S.R. Ghosh, GOC-in-C, Indian Army's Western Command. While a WAC sponsored sortie in a Jaguar trainer for a simulated battlefield area strike must have been an adrenalin-rushing experience for the GOC-in-C, it is hoped that it also helped both the Indian Army and the IAF in firmly understanding the inevitable need for joint planning and joint operations in all future military endeavours. SP

—Air Marshal (Retd) V.K. Bhatia



EUROPE SHORTLISTED

There is agreement in some quarters that technical considerations had dictated the shortlist for the MMRCA order, overriding other aspects such as the ones aimed at boosting Indo-US relations that have been steadily warming in the past decade and upgraded to the level of “strategic partnership”

AFTER ANOTHER SPELL OF agonising wait in pursuit of India’s ‘mother of all’ defence deals, it were only the European skies which seem to be opening up to receive the \$11 billion (₹49,500 crore) medium multi-role combat aircraft (MMRCA) ‘manna’ from the heavens. Yes, it is official. India has shortlisted two out of the six vendors competing for the 126-aircraft multi-role combat aircraft programme, and both are from Europe. The final race would now be between the French Dassault Rafale and the Eurofighter Typhoon, built by European four-nation consortium of EADS Cassidian representing Germany and Spain, Britain’s BAE Systems (BAES.L) and Italy’s Finmeccanica (SIFI.MI). The Indian Ministry of Defence (MoD) has accordingly asked the two European companies to extend their commercial bids till December 31, which were to have expired by end April. Officials at the Ministry also confirmed that the other four vendors namely the US Boeing (F/A-18 E/F Super Hornet) and Lockheed Martin (F-16 IN Super Viper), Russian UAC Mikoyan (MiG-35) and the Swedish Saab (JAS-39 Gripen NG) have been asked to not extend their commercial bids. A Defence Ministry official who did not want to be identified said, “The final deal is likely to be signed by the end of the current financial year. At present, an exercise of benchmarking is on.” Benchmarking, incidentally, refers to a process in which a “range of reasonable cost of acquisition” is determined, the official explained. He also said that the four companies that have not been shortlisted have been rejected on technical grounds and the reasons for rejection have been conveyed to them individually.

Separately, Saab, Boeing and Lockheed Martin have confirmed their exit from contention in what could be termed as one of the most highly prized defence contracts in recent times. “We have received this decision and will closely monitor the future process and provide additional information if requested by the Indian Ministry of Defence,” Saab said in a statement. The Seattle-based US company Boeing said, “Boeing has been notified that our Super Hornet proposal for India’s MMRCA competition was not shortlisted in the initial down select. We are obviously disappointed with this outcome. Our next step is to request and receive a debrief from the Indian Air Force. Once we have received the details, we will make a decision concerning our possible options, al-



ways keeping in mind the impact on the Indian Air Force.” As far as Lockheed is concerned, one of its New Delhi-based spokesperson said it was told by US authorities that Washington would respond to the Indian Defence Ministry’s letter on the competition. Apparently, there was no response from the Russian side. Their earlier non-participation by MiG-35 in the Aero India 2011 air show indicated that perhaps they had already got a whiff of not making it in the final cut and therefore, chose not to comment at the time of actual short-listing.

The short-listing has given rise to a plethora of theories, speculations and deductions. There is general agreement in some quarters that technical considerations had dictated the shortlist for the MMRCA order, overriding other aspects such as the ones aimed at boosting Indo-US relations that have been steadily warming in the past decade and upgraded to the level of “strategic partnership”. “The fact that the Americans are out of the shortlist clearly indicates that the IAF and the Indian Government went purely by technical parameters, and not so much by strategic considerations,” said an analyst from the New Delhi-based Institute for Defence Studies and Analyses (IDSA). Agreeing, another Delhi-based defence analyst commented that the European aircraft being of newer generation may have been technically more capable than the comparatively older generation aircraft offered by the US companies. It is believed that out of an exhaustive 643 parameters examined during the evaluation phases, it were the European fighters Eurofighter and Rafale, out of the six contenders, which met the laid down criteria in most cases.

Be that as it may, there is little doubt that the announcement has caused considerable consternation in the US circles. The US Ambassador to India Timothy Roemer publicly conveyed his deep disappointment that Boeing and Lockheed Martin were not among the finalists. In a separate announcement he also tendered his resignation though citing personal reasons for his decision to quit.

The questions that loom large are: Will the ‘shortlist’ decision cause a setback to the growing Indo-US strategic partnership? Also, going by their reactions, is there a likelihood that the US companies would challenge the Indian decision? What, if any, are the other issues? Turn to Forum for some thought-provoking analyses. SP

—Air Marshal (Retd) V.K. Bhatia

EVENLY SPREAD

The US companies may be lamenting having lost the MMRCA deal, but they would do well to remember that many more are coming their way. The IAF is seriously thinking in terms of placing orders on Lockheed Martin for additional C-130J aircraft. Similarly, the order for the acquisition of C-17 is being revised upwards.

THE INITIAL INDUSTRIAL AND diplomatic reaction in the US circles to the non-inclusion in the shortlist of US jet fighters contending for India's medium multi-role combat aircraft (MMRCA) has been nothing short of utter dismay and deep disappointment. Though not openly acknowledged, it is generally believed that India discarding the US airplanes to favour their European competitors may have led to Timothy Roemer resigning from his Ambassadorial post. It may be recalled that after the US Administration under President George W. Bush had gone out of its way to see the extraordinary Indo-US civilian nuclear deal through despite strong dissensions—both internal and international—the two countries, after signing the New Framework for Defence Relationship (NFDR), embarked upon rapidly building a strong long-term defence relationship. Of great significance was the fact

that earlier taboos had been cast aside and the US floodgates opened up with almost the entire range of advanced military equipment including the latest versions of F-16 and F-18 on offer to India. In the immediate aftermath of the signing of the Indo-US Civilian Nuclear Agreement (also known as the Indo-US 123 Agreement), a question had openly started to do the rounds whether as a quid-pro-quo, 123 would equal 126? In other words, would the nuclear deal give the US fighters a definitive edge over other contenders in the fiercely competitive Indian Air Force (IAF) project to acquire 126 multi-role combat aircraft (MRCA)? At the time, the US was so sure of clinching the deal that it started dangling the bait of spin-offs from its under-development fifth generation fighter (F-35) if either F-16 Fighting Falcons or F/A-18 Super Hornets bag India's 126 MRCA project, valued at \$11 billion (₹49,500 crore approximately). In this context, a presentation was



THE IAF'S CHOICE IS BASED ON TECHNICAL EVALUATION. IT IS QUITE STRAIGHTFORWARD AND THERE IS NOTHING POLITICAL ABOUT IT. IT IS JUST A PROCESS; THE OTHER PROGRAMMES (US AND RUSSIAN) WERE FALLING SHORT IN THE TECHNICAL STANDARDS NEEDED BY THE IAF. IT IS GOOD THAT THERE IS PROGRESS IN THE MMRCA COMPETITION. THE COMMERCIAL NEGOTIATIONS WILL START NOW.

—FORMER AIR CHIEF MARSHAL (RETD) S. KRISHNASWAMY



THE IAF HAS DILIGENTLY COMPLETED THE EVALUATION AND SELECTION PROCESS KEEPING IN MIND THE CAPABILITIES REQUIRED IN THE MEDIUM MULTI-ROLE COMBAT AIRCRAFT. EUROFIGHTER TYPHOON AND DASSAULT RAFALE WERE FOUND COMPLIANT WITH THE IAF REQUIREMENTS. MANY FACTORS ARE TAKEN INTO CONSIDERATION DURING THE TECHNICAL EVALUATION AND FLYING TESTS INCLUDING LIFE CYCLE MAINTENANCE, OTHER FACILITIES, ETC. IT WAS A PURE SELECTION PROCESS, POLITICAL AND COMMERCIAL NEGOTIATIONS WILL START NOW.

—FORMER CHIEF OF THE AIR STAFF AIR CHIEF MARSHAL (RETD) F.H. MAJOR

I STILL CONSIDER THE US MADE BOEING F/A-18 AND LOCKHEED MARTIN F-16 IN THE BEST. AND IF I WERE ASKED TO SELECT BETWEEN EUROFIGHTER AND DASSAULT RAFALE, I WOULD GO FOR RAFALE.

—A FORMER CHIEF OF THE AIR STAFF ON THE CONDITION OF ANONYMITY

also made to the IAF at Air HQ on the ongoing F-35 Joint Strike Fighter indicating it could fulfill India's future needs as a follow up to the slated induction of 126 MRCA. The IAF was indeed on the lookout for a fifth generation fighter with a lethal mix of stealth, beyond visual range (BVR) combat capabilities, superb manoeuvrability and super-cruise capability. The US thinking was that if India moved on fast track in its favour on the 126 MRCA project, then the fifth generation fighter needs of the IAF could also be factored into the overall scheme of things.

But it did not happen that way. First, it was too much of an expectation that the languorous bureaucratic system involving acquisition of defence equipment could actually move on a fast track. Second, were the three 'guiding principles' which had been outlined by A.K. Antony, the meticulous Defence Minister of India with a squeaky-clean honest image. These were: IAF's operational requirements should be fully met; the selection process should be competitive, fair and transparent to ensure best value for money; and Indian defence industries should get an opportunity to grow to global scales due to the mega size of the project.

The roaring skies of Bengaluru during as many as three biennial Aero India air shows (2007, 2009 and 2011) stand testimony to the fact that the selection process though long has been fiercely competitive. Exhaustive and detailed technical and field evaluations too indicate that the process has been fair and transparent and short-listing of the European fighters suggests that the selection has been done based purely on technical and performance parameters. It may be noted that from the initial issuance of the request for information (RFI) in 2003, the India's MRCA project continued to move up the 'role accretion' scale as bigger and more advanced jet fighters started to join the lucrative programme. With the numbers of vendors eventually swelling up to six, it soon became evident that the competition was getting divided between two blocs of light-weights (Lockheed Martin F-16 IN Super Viper, Saab JAS-39 Gripen NG, Mikoyan MiG-35) and the heavy-weights (Boeing F/A-18 E/F Super Hornet, Eurofighter Typhoon, Dassault Rafale). As a matter of fact another 'M' was added to the MRCA nomenclature and it came to be known as medium multi-role combat aircraft (MMRCA) project.

With the IAF gradually moving into 'mission-creep mode', it was getting clear that there were greater chances of the heavy-weights getting the nod for short-listing. Lockheed Martin's F-16 IN Super Viper, though a superb fighter in its own right, apart from being bracketed in the light-weight category, also had to contend with the psychological disadvantage of the F-16s being in service with the Pakistan Air Force (PAF).

In the end, selection of the Eurofighter Typhoon and Dassault Rafale amply proved the point of the heavy-weights being short-listed. However, what has baffled many defence experts and industry watchers is that Boeing's Super Hornet did not make the cut. But perhaps, even this should not come as a surprise, because even with the excellent addition of latest avionics and weapons capabilities, there was a great possibility that the aircraft's older airframe design (sans the fore canards and other aerodynamic refinements) would be found wanting in the department of aerodynamic manoeuvring vis-à-vis its more recently designed fourth generation+ competitors.

As is known, both the shortlisted companies have been

asked to extend their commercial bids till December 31. With both aircraft having met the technical and performance specifications, the L1 issue could have a decisive impact on the outcome of final selection. On the other hand, political considerations could also weigh heavily in awarding the contract which brings to the fore the often-quoted statement of the Prime Minister Manmohan Singh that "maximum possible geopolitical/diplomatic mileage should be derived from military deals of such nature". Therefore, is there a possibility that selection of the European companies though ostensibly merit-based, has also resulted in introducing a geopolitical angle, either inadvertently or in a subtle manner?

India, emerging as a fast-growing economic powerhouse in the new millennium, is faced with increasing security challenges, especially from its belligerent western neighbour Pakistan and increasingly assertive China in the north. In trying to make up for the 'lost-decade' of the 1990s and to adequately safeguard its interests, India is embarked upon a massive modernisation programme for its armed forces running into many billions of dollars in the coming decades. At the same time, India seeks to favourably engage not only the US but all major power blocs as a bulwark against growing Chinese challenge. What better way to achieve this than to spread the 'defence gravy' equitably amongst all its powerful friends, who are also the manufacturers of state-of-the-art defence equipment.

According to Stockholm International Peace Research Institute (SIPRI), India has become the largest arms importer in the world, receiving nine per cent of the global arms transfers in 2006-10, overtaking China in the process. Even a casual glance at India's recent defence deals would indicate that the procurement sources have been well diversified whether it is the Russian Federation, Europe or for that matter even the US. The Russian Su-30 MKI, PAK-FA, Admiral Gorshkov, etc; the British Hawk, the French Scorpene and the upcoming Mirage 2000 upgrade are just a few cases to prove the point. The US too in just a few years of opening up its arms market to India has been a major beneficiary of the Indian defence orders. Starting with the BBJs, other IAF orders include the C-130J Super Hercules and the C-17 Globemaster III. The Navy on its part not only acquired the USS Trenton (now INS Jalashwa) and helicopters but also placed an order for eight P-8I Poseidon with options for more running into billions of dollars. The US companies may be lamenting having lost the MMRCA deal, but they would do well to remember that many more are coming their way. For example, the IAF is seriously thinking in terms of placing orders on Lockheed Martin for additional C-130J aircraft. Similarly, the order for the acquisition of C-17 aircraft from Boeing is being revised upwards to the extent that in dollar terms, even by itself, it would come close to the MMRCA project.

In view of the above, is there a reason for the US to still feel unhappy towards 'ungrateful' India? More importantly, would it cause a setback to Indo-US relations, as believed in some political/diplomatic quarters? Perhaps, the best person to answer the question was the US Ambassador Roemer himself when he stated that the US-India relationship continues on a "positive historic trajectory" and that, "the horizons of our relationship truly have no limits". That sums it up. SP

— Air Marshal (Retd) V.K. Bhatia

Solar Power



SOLAR PLANE MAKES MAIDEN INTERNATIONAL FLIGHT

POWERED BY THE SUN, a solar energy plane made the world's first international flight recently showcasing the potential for pollution-free air travel.

The Solar Impulse took off from an airfield at Payerne in western Switzerland and landed at Brussels airport after a 13-hour flight.

The Solar Impulse project began in 2003 with a 10-year budget of 90 million Euros (\$128 million) and has involved engineers from Swiss lift maker Schindler and research aid from Belgian chemicals group Solvay.

The plane, which requires 12,000 solar cells, embarked on its first flight in April 2010 and completed a 26-hour flight, a record flying time for a solar powered aircraft, three months later.

With an average flying speed of 70 kmph (44 mph), Solar Impulse is not an immediate threat to commercial jets, which can easily cruise at more than 10 times the speed. A flight from Geneva to Brussels can take little more than an hour.

The single-seat had lifted off gently in clear blue skies from Payerne air base after being delayed by early morning mist.

It covered roughly 480 km from western Switzerland to Brussels airport, flying over France and Luxembourg at 3,600 metres.

Solar Impulse HB-SIA, which has the wingspan of a large

airliner but weighs no more than a saloon car, made history in July 2010 as the first manned plane to fly around the clock and through the night on the sun's energy.

It holds the endurance and altitude records for a manned solar-powered aeroplane after staying aloft for 26 hours, 10 minutes and 19 seconds above Switzerland, flying at 9,235 metres.

The high-tech plane has since flown several times, notably between Geneva and Zurich airports, but the journey to a busy airport in Brussels through crowded airspace was regarded as a new test.

HB-SIA relies on 12,000 solar cells on its 64-metre wings to charge the batteries that provide the energy for the 10-horsepower electric motors driving four propellers.

Its record-breaking flight last year demonstrated its capacity to store up enough energy to fly through a summer night.

The Solar Impulse team is planning to fly even further, including possible trans-American, trans-Atlantic and round-the-world flights in stages in 2013 and 2014 using a slightly larger aircraft. [SP](#)



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Manned & Unmanned

NORTHROP UNVEILS NEWEST INTELLIGENCE-GATHERING AIRCRAFT SYSTEM

NORTHROP GRUMMAN CORPORATION HAS unveiled a new intelligence-gathering aircraft that can be flown either robotically or with a pilot on board.

This view of the firebird shows its wide sensor-carrying capability as well as its low overall volume. It will help military users get real-time high-definition video, view infrared imagery, use radar and even listen to communications signals all at the same time using a new intelligence-gathering aircraft system.

Firebird offers a large internal payload bay and an ability to operate multiple intelligence, surveillance, reconnaissance (ISR) and communications payloads simultaneously through a universal interface. The system is designed to be flown as a manned or unmanned aircraft.

As lead for the Firebird programme, Northrop Grumman has developed the unmanned systems architecture, control and mission systems. The company chose Scaled Composites to design, build and test the aircraft with first flight occurring just 12 months after the initial concept discussions.

"We have harnessed the innovative techniques of Northrop Grumman and Scaled Composites to deliver an unprecedented information-gathering capability," said Paul Meyer, Vice President and General Manager of Advanced Programmes and Technology for Northrop Grumman Aerospace Systems. "Firebird addresses future budgetary constraints by combining the best of our piloted and unmanned ISR systems into a single solution ready for a variety of ISR missions."


Firebird's universal interface is similar to plugging a memory stick into a personal computer that is automatically

recognised without needing to load additional software.

"Not only have we increased the number of ISR sensors working simultaneously in an aircraft of this size, but we can also incorporate various sensors that complement each other, enhancing Firebird's information-gathering value for warfighters," said Rick Crooks, Northrop Grumman's Firebird Programme Manager. "Firebird is an adaptable system that makes it highly affordable because of the number of different missions it can accomplish during a single flight. It's a real game changer."

From inception, Firebird was designed to be flown as a manned or unmanned aircraft and can be quickly modified for either option. It is set for an operational demonstration in an optionally-piloted configuration from May 23 to June 3, 2011, during Empire Challenge 2011, a military exercise run by the US Joint Forces Command.

Scaled Composites, LLC is an aerospace and specialty composites development company located in Mojave, California. Founded in 1982 by Burt Rutan, Scaled has broad experience in air vehicle design, analysis and fabrication, and developmental flight tests of air and space vehicles.

Northrop Grumman is a leading global security company providing innovative systems, products and solutions in aerospace, electronics, information systems, and technical services to government and commercial customers worldwide. 

PHOTOGRAPH: NORTHROP GRUMMAN



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LOW COST: SPICEJET
WILL SOON START ITS
REGIONAL SERVICES WITH
HYDERABAD AS ITS HUB

PAVING *the* Runway

By R. Chandrakanth

There is so much promise with regard to the growth of the hinterland, both in terms of passenger and cargo movement. The government is giving sops for airlines and with infrastructure soon in place the next big aviation wave will be from the hinterland which is waiting to be connected.

TRANSPORTATION INFRASTRUCTURE, BE IT surface, sea or air, has been an area of concern in India. That many towns and villages have not been properly networked is a fact that we continue to live with. Only of late, there has been some movement as “the powers that be” have started realising its importance as a catalyst for growth.

In this realisation, the Ministry of Civil Aviation recently announced a strategic plan—to create world class infrastructure facilities; establish regulatory framework in consonance with international standards; connect un-served and under-served areas; develop skilled manpower according to the needs of the industry; and deploy advanced technologies for the optimal growth of the sector.

From this stated policy, the plan of connecting un-served and under-served areas and deploying advanced technologies for regional aviation’s optimal growth assumes significance as there is a clamour on making the regional aviation regime more airline-friendly. A sizeable chunk of the population has

remained ‘unconnected’ or ‘disconnected’ due to the city-skewed policies. Less than two per cent of Indians fly annually. That spells enormous opportunities as well as the challenges.

With the low-cost carrier model having taken off, regional aviation is waiting in the wings, albeit for quite a while. In 2008, the government announced a regional aviation policy and several players showed intent of operating regional airlines. They included MDLR, Jagson Airlines, Star Aviation, Zav Air, Mega Airways and Premier Airlines. Recently, low-cost carrier SpiceJet announced that it would soon launch its regional services with Hyderabad most likely as its hub. SpiceJet has ordered 15 Bombardier Q400 turboprop aircraft with a seat configuration of 70 to 80.

SpiceJet will be the first Indian airline to operate these modern turboprop aircraft from Canadian manufacturer Bombardier. Until now, Air India, Jet Airways and Kingfisher Airlines have all used the Franco-Italian ATR turboprops. Bombardier regional jets are used by JetLite and Air India Regional.

As per the Directorate General of Civil Aviation (DGCA),

Gurgaon-based MDLR Airlines with two 70-seat Avro146-170 was registered as a regional airline in 2008. While there is a regional airline policy in place, decision-makers are only waking up now on the need to create an infrastructure conducive for their operations. One of them is airport modernisation and the Airports Authority of India (AAI) has embarked upon modernisation of 35 airports across the country, which when complete will have networked air infrastructure to a reasonable level.

CONCESSIONS FOR REGIONAL AIRLINES

Though India is supposed to be having 449 airports/airstrips including 28 civil enclaves at defence airfields, the operational ones are less than 100 with many not having proper runways and other infrastructure. And in civil enclaves, flight timings are restricted to be between sunrise and sunset, an issue which needs to be addressed.

The government is keen on encouraging development of regional airlines based on small aircraft to provide airlinkages in the interior areas of the country. Regional hubs, the government indicated, will have to act as operational bases for regional airlines and also have all the facilities currently postulated for model airports, including the capability to handle limited international traffic.

The policy allows exemption from all airport and navigation charges for regional carriers that fly small aircraft (below 40,000 kg) and payment of concessional tax of four per cent on fuel against 35 to 36 per cent for national carriers. Regional airlines can start operations with only one aircraft (instead of five) and equity of ₹12 crore, instead of ₹50 crore. Regional airlines are permitted to operate flights only to or from one city (except in the south, where they can operate between Hyderabad, Chennai and Bangalore). Regional airline aspiration is to connect III and II tier cities with the major cities.

Kapil Kaul, CEO (Indian subcontinent), Centre for Asia Pacific Aviation (CAPA), has said, "Traffic growth has only just begun between large and small cities. Between the small cities, it is yet to begin in a major way, which means that at least for now, there is no viable market for regional airlines in regions apart from the south."

Such encouraging trends are happening in other parts of the world too. China for instance has revised its regional aviation policy. Guo Qing, Vice President, Marketing, Embraer China has said that Embraer is 'very optimistic' about the future development of China's domestic regional aviation market, especially in the country's underdeveloped regions.

Embraer jets will soon be flying in more numbers after China decided to scrap airport construction fees for domestic short-haul flights beginning this year, aimed at boosting the aviation market in the country's economically less-developed areas, especially the central and western regions. The exemption on fees included eight models of regional aircraft, including Embraer's regional jet (ERJ) series, covering 844 routes that connect 129 Chinese airports.

MIX AND MATCH

As for regional aircraft, the operators are spoilt for choice. There are the turboprops and the regional jets from the stables of Bombardier; Embraer and ATR. Regional jets from Russia, China and Japan are in the pipeline. Considering the regional outlook, India has also announced its plans of a 70



FRANCO-ITALIAN:
ATR 72-500 WITH
KINGFISHER

to 90-seat regional transport aircraft, for which a feasibility report is being prepared by a national committee.

The market dynamics are such that airlines have to look at "right size" aircraft and also 'mix and match' as the concept of "one size fits all" does not work anymore. Nevertheless, the 50 to 100-seat aircraft is gaining market share.

At a recent conference, Chuck Pulakhandam of Embraer, predicted how in 2012 the secondary markets will overtake the primary ones. The operator base was 27 per cent (mixed operators) with seat configurations of above 250; 51 per cent in the 50 to 250-seat category and 22 per cent in the 20 to 50-seat category. And in the 51 per cent, 70 to 120-seat category was fast growing.

With road connectivity improving, short haul flights (up to 300 km) do not make business sense with 45-minute check-in rule; time taken to and from airport and pricing. It negates the advantages of flying. Regional jets have proven to be ideal for flying on routes that are too "thin" to support traditional narrow body aircraft service, and this has helped regional aviation capacity expand rapidly.

Airline players who are planning to enter this segment will have to factor such issues and then work out their route network and markets. The SpiceJet route appears to have potential. By operating a regional airline, it will be offering never-before kind of connectivity between a small airport and city airport, taking on the real meaning of a 'feeder' airline. Airlines will have to look at the potential of operating 100-seat jets more economically through higher utilisation and a denser seat configuration.

While all these issues may affect the regional business model to some degree, the growth of the 70 to 120-seat aircraft with the promise of superior economics, will stimulate the growth of the regional aviation market.

There is so much promise with regard to the growth of the hinterland, both in terms of passenger and cargo movement. The government is giving sops for airlines and with infrastructure soon in place the next big aviation wave will be from the hinterland which is waiting to be connected. **SP**

Yet to *Takeoff*

A full service FBO seems to be a distant reality in India and all that can be found here is 'limited use' FBO. They are single service providers, having one or a few facilities. In fact, with regard to ground handling services, some of the airline operators prefer to do it themselves.

By **Sucheta Das Mohapatra**
&
R. Chandrakanth

ILLUSTRATION: ANOOP KAMATH

WAY BACK IN 1926, the term fixed-base operator, or commonly abbreviated FBO, was coined in the US after the passage of the Air Commerce Act. Eighty-five years later, the FBO concept in its totality does not exist in India or if it does, it is highly fragmented and yet to take off. However with the aviation industry shifting gears and moving on the fast track in India, there is sudden realisation that FBO needs to be formalised the way it is elsewhere.

As India Inc. is in a growth momentum, corporate understand that time is of key essence. Owning a jet is not just 'value for money', but also 'time is money'. Business aviation is up-and-coming and so is the demand for FBO. But even as the private industry is flourishing and private jets have become a regular mode of transportation for the Indian corporate world, a full service FBO, as in Europe or the US or even the Middle East, is still a far cry in India.

Growth rates in Asia and the Middle East have generally been higher, but in most cases that growth reflects the low starting point for business aviation in these locations. Expansion of traffic is certainly fuelling FBO expansion in these potentially promising regions, but in countries such as China and India at least, the process of rolling out dedicated handling infrastructure for business aircraft is still far from straightforward.

Many non-scheduled operators (NSOPs) even doubt whether India really has an FBO and all that can be seen are mere VIP lounges. For them, FBO is a set-up which facilitates a whole lot of services which not only go to make the flight, but also takes care of requirements on ground.

CLASSICAL FBO

"A classical FBO as the world understands is basically a place where aircraft services such as ground handling, refuelling, servicing of aircraft, a terminal where passengers go through, terminals where the crew can relax, security and customs exist. Jet Aviation, ExecuJet Aviation, Strand Aviation, are some of the best examples of a full-fledged FBO. This is non-existent in India," says Rohit Kapoor, Managing Director, Arrow Aircraft Sales and Charters Pvt Ltd. He is

also the sales representative of Gulfstream in India.

A classical FBO or a full service FBO as seen in Europe or the US, handles all kinds of services right from sale of aviation fuel, line services for general aviation aircraft, air taxi and air charter operations, scheduled or non-scheduled air carrier services and support service, pilot training, aircraft rental and sightseeing, aircraft sales and service, aircraft storage (tie-down or hangar), repair and maintenance of aircraft, sale of aircraft parts, aerial photography, crop dusting/aerial application, aerial advertising and surveying, provides restroom facilities, communication access (telephone, Internet access, fax), and waiting areas, food vending/restaurant facilities, ground transportation arrangement, flight planning and weather information areas (computer or telephone based), pilot/crew rest lounges and showers, aviation supplies shop (selling navigation charts, manuals, or in-flight comfort items), access to in-flight catering, and accommodations reservations/concierge services for both crew and passengers through customer services representatives, etc. In many cases, they also operate flight training schools, provide aircraft repairs and maintenance, provide fuel and provide pilot support with weather and flight planning facilities.

However, a full service FBO seems to be a distant reality in India and all that can be found here is 'limited use' FBO. They are single service providers providing one or a few services. With regard to ground handling services, some of the airline operators prefer to do it themselves. When the Indira Gandhi International Airport (IGIA) made it compulsory for all general aviation operators to use ground handling services provided by Shaurya Aeronautics Private Limited (SAPL), they were up in arms. Airline operators have moved the courts for relief, stating that they could handle the services themselves as to distinguish their service from competition. Lately, Cambata Aviation is the official ground handler at IGIA as DIAL did not renew the contract of SAPL.

BONE OF CONTENTION

One other bone of contention has been pricing and airline operators state that 'monopolistic' trends lead to exorbitant pricing which is not good for the airlines which are already squeezed for margins. Airline operators have said that this



PHOTOGRAPH: JET AVIATION

decision militates with the spirit of Competition Act 2002. Some are rather comfortable if the airport operator enters into arrangements with more than one service provider to make available their services at competitive and attractive costs to the aircraft operators. "We have no choice. We are forced to avail the services, though they charge hefty amounts. If we had the option of choosing from two or three vendors, one particular service provider would not be able to dictate the rate and each would try to give their best," opines Group Captain (Retd) A.K. Sachdev, Director Operations, Aviation Division, Oberoi Group.

But Sandeep Saraf of SAPL, the erstwhile FBO of IGIA, says to have such a kind of FBO in India is not feasible. "In India the concept is different." However, he dismisses the issues confronting the airline operators with regard to ground handling, stating "all is well". SAPL is now looking forward to bid for FBO service in other metros. Aircraft management is yet another aspect which the company will soon venture. "We are likely to start the service by August," reveals Saraf.

The 'single option' FBO is in accordance with the 2007 airport ground handling policy with the excuse that 'enhanced security' necessitates it. The airlines have been deferring its implementation. If the policy gains acceptance across the country, then it would mean airlines will not be carrying out ground handling of their flights. According to the policy, only three ground handlers will be allowed to perform this function at the six metro airports across India.

The ones who showed expression of interest then included Globe Ground India; SPDH Services Portugues de Handling SA/Aviation India; Equity Aviation Services/Cambata Aviation; Dnata/Track India; Celebi Ground Handling Turkey/Spencer Travel Services; Iberia/ISMT/Taneja Aerospace/JMD Consultants; Bhadra International/Navia International Consulting; Penauille Servis Air/RR Joshi; Swissport Punj Lloyd India; Worldwide Flight Services/Bird Consultancy Services; Jet Air/Aircraft Services International Group; Bahrain Airport Services/NAS Kuwait/Nova Aviation Services; Indian Airlines; Singapore Airport Terminal Services; Evergreen Aviation Ground Logistic Enterprises/JJ Hospitality Services; Global Aviation Services/Knafaim Holding Ltd, Tel Aviv; Jeena & Company Mumbai and O.S.S. Aviation, Bhopal. Universal Aviation has been providing weather information services, besides other FBO related in Delhi and Mumbai.

The Ministry of Civil Aviation recently sought a plan from all domestic airlines on implementation of the new ground-handling policy. The authorities decided to finally implement it in January this year, but the airlines went to court which asked the airlines to toe the line. They have now gone on appeal in the Supreme Court.

However, at non-metro airports, the Ministry has written to all airlines to hire their own staff to do ground handling. Many of the airlines have outsourced the ground handling work, as it is cheaper for them to do so.

According to industry experts, the value of ground han-

Many NSOPs even doubt whether India really has a FBO and all that can be seen are mere VIP lounges



dling business at airports across the country is estimated to be around ₹1,000 crore, divided between a large number of small agencies working at most of the airports. With the Airports Authority of India (AAI) having embarked upon a modernisation plan for 35 non-metro airports, it is believed that this will throw open opportunities for FBOs.

Although every business aviation airport around the world has more than one FBO, many feel that in India having more than one FBO in an airport in India is not economically viable as the traffic volume is less. But what disturbs the operators is the lack of a plan for it. "The scenario is bad and it is basically because of the government apathy towards general aviation," says Sachdev. Kapoor speaks in unison, "The government needs to change its

perception regarding business aviation and in fact civil aviation also. The overall attitude towards commercial aviation will take time to mature. It will take its own time."

HUGE POTENTIAL – BUT NO FRAMEWORK

A report by the Centre for Asia Pacific Aviation (CAPA) highlights some of the hurdles that need to be cleared before take-off. Ensuring that dedicated infrastructure is available (fixed base operators at airports, helipads, aircraft management companies, maintenance facilities and training centres)—and in the right places—is a primary condition. Air navigation services and air traffic control are equally important but sometimes forgotten. And preparing to deliver the necessary levels of skilled resources is also essential.

When it comes to maintenance works, aircraft owners prefer to go to the service centres, authorised by the original equipment manufacturer (OEM) in the country. For example AirWorks is the authorised service centre of Gulfstream in India and takes care of the maintenance work of all its aircraft. Similar is the case with jet owners of other make.

Today, business jet owners are forced to utilise the FBO services available in Singapore, US, Dubai or Europe. A business tour outside the country serves both the purpose. During the trip, most jet owners prefer to go to the authorised OEM service centre which is also a FBO. "Buyers of business jets are not happy. Except in Mumbai and Delhi, there is no FBO elsewhere in the country; they have to go through the regular terminals despite owning their own charters. They do not find a place to even park. There are no hangers and there is no policy to even own a hangar of their own," says Kapoor.

Jet operators in India still feel that a classical FBO in India is not a probable concept as there are many things which are under government control. For example, fuel in India is available at the standard rate fixed by the government and so, unlike elsewhere, customers would not get attracted to a FBO for giving them a better bargain. Likewise, maintenance which is part of FBO service elsewhere, is a different ball game in India—there is need for maintenance approval, separate hangers, etc. "There is a need. FBOs will definitely come up in India. But they will be between a VIP lounge and a classical FBO. A mix between the two," says Kapoor. SP



Infrastructure MUST Keep Pace

*General aviation has been the 'quiet revolution' of Indian aviation, says **Captain (Retd) Pankaj Chopra**, Vice President, Religare Aviation Limited. There are over 100 non-scheduled operators in India and the number is growing but the pace of infrastructure growth has been far from desirable. Fixed base operators—one of the key ingredients for a robust growth—is lagging behind. Pankaj Chopra in an interview with R. Chandrakanth.*

SP's Aviation (SP's): Could you tell us briefly about Religare Voyages and the future plans, considering the growth of the general aviation (GA) sector?

Pankaj Chopra (Chopra): Religare has been the front-runner in the charter business for many years now. From just one C-90 five years ago, we have progressed to a fleet of 12 aircraft which includes two helicopters. The mix of turboprops, jets and helicopters gives us extreme flexibility and we can cater to all types of business and operational requirements. We intend to develop this capability further and go into regions hitherto not serviced by air travel. Air Charter business is no longer limited to the corporate and political segment.

SP's: What is the outlook for the general aviation industry in India?

Chopra: GA was the 'quiet revolution' of Indian aviation. It took place in tandem with the revolution in the airline business from 2004 onwards but got overshadowed by the latter. Nearly 150 aircraft have been imported into India under charter/private category in the last three-four years. There are 100 plus non-scheduled operators in India and the number is growing by the day. Nearly 200 more small aircraft will be inducted into India in the next three-four years. So the future is indeed bright, provided the infrastructure and other support keeps pace with the demand.

SP's: As an operator, could you list out some of the challenges and what needs to be done?

Chopra: GA operations have significant differences from scheduled operations and need to be treated as such. A very tight squeeze as far as infrastructure availability at airports is

concerned. Considering that nearly 200 aircraft are on order to the existing 200, enough space should be made available. The requirement of space is not only for parking but also hangarage, maintenance facilities, separate GA facilities at airports. Most aircraft being inducted are extremely sophisticated and expensive and require high standard facilities.

Non-scheduled/GA operators often fly to small and unused/uncontrolled airports/helipads. A lot of these airfields/landing strips do not have any published operational data. There is therefore an element of risk involved in operating to such places. There needs to be a comprehensive document published about information on all airfields in India.

All aviation regulations are basically airlines-centric and do not address a variety of issues typical to general aviation. There needs to be a separate body established to look into this very important issue. Rules and regulations need to be drafted/modified to cater to non-scheduled operations.

GA fraternity needs to be included into the various collective activities organised by the Ministry of Civil Aviation so that their issues get represented and resolved.

SP's: Has the general aviation segment represented to the government on FBO and other requirements?

Chopra: No recognised body has been formed as yet which is authorised to represent all non-scheduled operators and take their concerns to various regulatory bodies. Hence the issues are either presented individually which doesn't carry collective weight or not presented at all. This leaves gaps in both safety and efficiency of GA operations. Nevertheless, the regulators are seized of the need for separate facilities like FBOs and separate GA terminals. Hopefully, some action would soon start towards progressing these.

SP's: Why is there a clamour for major airports which are already congested?

Chopra: GA sector clamours for metros because that is where basic facilities are available for them. Notwithstanding that, GA operations are best done from smaller satellite airfields the world over. If our smaller airfields offer adequate facilities for GA, operators would gladly move over to them and save significant costs. SP

FUTURISTIC:
PRATT & WHITNEY
F135 ENGINE

POWERFUL *Performance*

Over the decades, the military aviation industry has developed a bewildering array of advanced engines, each claiming to be of superior performance. However, as engines become more powerful, environmental concerns are correspondingly growing. Apart from raw power, military aero engine designers will increasingly need to pay attention to green parameters.

PHOTOGRAPHS: PRATT & WHITNEY, EUROFIGHTER, GE AVIATION AND SNECMA

WHEN IT COMES TO military aircraft, whether meant for high-inten-

sity combat or air transport, there's a premium on performance. And the power plant is the very heart of performance. But for sheer power, look no further than the Pratt & Whitney F135. It is an afterburning turbofan specially developed for the keenly-awaited Lockheed Martin F-35 Lightning II. The F-35 is a family of stealthy, single-engine, fifth generation, multi-role fighter, under development in the United States. While the F-35A is a conventional take off and landing variant, the F-35B is a short take off and vertical-landing aircraft, and the F-35C is a carrier-based option. The same F135—claimed to be the world's most powerful fighter engine—will power all three F-35 variants.

The F135 is derived from the Pratt & Whitney F119-PW-100 that powers the US Air Force's (USAF) battle-proven F-22 Raptor. It has a thrust of 43,000 lbf (191.3 kN) with afterburner and 28,000 lbf (128.1 kN) dry. It is a two-shaft engine featuring a three-stage low pressure (LP) fan and a six-stage high pressure (HP) compressor. The hot section has a short annular combustor with a single-stage HP turbine unit and a two-stage LP turbine. The F135 has approximately 40 per cent fewer parts than legacy engines, which contributes to its improved reliability. It includes advanced prognostics and health management systems. All line-replaceable compo-

By **Joseph Noronha, Goa**

nents can be removed and replaced using a set of six common hand tools.

The futuristic F135 engine originally had a close competitor—an engine designated the F136 and produced by the Fighter Engine Team (FET) comprising GE Aviation and

Rolls-Royce. The F136 has a twin-spool, counter-rotating, low aspect ratio, axial flow compressor, an annular combustor, and an axial flow, counter-rotating turbine. Its claimed maximum thrust range is 40,000 lbf. Lagging behind the F135 in development, this capable engine is now in the doldrums—a victim of massive cuts in the US defence budget. But so high are the stakes that the FET recently sought the Pentagon's permission to resume development of the F136, offering to spend a cool \$100 million of their own money for the purpose.

FIGHTER DUELS

In India, the hardware headlines have been dominated by the planned acquisition of 126 medium multi-role combat aircraft (MMRCA) for the Indian Air Force (IAF). The long-running MMRCA saga began with six contestants but four were dropped after failing to meet technical requirements, leaving only two aircraft—the Eurofighter Typhoon and the Dassault Rafale—in contention for the \$10.4 billion deal that could be inked by December.

The front-running Typhoon's twin EJ200 engines are manufactured by EuroJet Turbo GmbH consortium which comprises Rolls-Royce, MTU, Avio and ITP. These powerful turbofan engines, aided by the aircraft's excellent aerodynamics, reportedly allow it to super-cruise (i.e. to cruise supersonically without the use of reheat) at between 1.2 and 1.5 Mach for long periods. The EJ200 is

**LIGHTWEIGHT
ENGINE:** EUROJET
EJ200 TWIN ENGINES
ON EUROFIGHTER
TYPHOON



a lightweight engine with high strength and high temperature capability. It is a twin-shaft, afterburning turbofan, with three LP and five HP compressor stages, powered by two single-stage turbines (LP and HP). Rather unusually for an advanced turbofan, the fan lacks variable camber inlet guide vanes (IGV). The combustor is annular with air-spray injectors. Engine control is by an integrated full authority digital engine control (FADEC) system. Each EJ200 has a dry thrust of 13,500 lbf (60 kN) while the thrust with afterburner is 20,250 lbf (90 kN).

The Typhoon's fierce rival, the French Rafale, also has twin engines—Snecma M88-2 turbofans. Each engine has a dry rating of 11,250 lbf (50 kN) while the thrust with afterburner is 17,000 lbf (75.6 kN). The M88-2 comprises a three-stage LP compressor with IGV, an annular combustion chamber, single-stage HP and LP turbines, a radial afterburner chamber, variable-section convergent flap-type nozzle and FADEC. It was designed with easy maintainability and reduced operating costs in mind. It consists of twenty-one modules for interchange and replacement repairs without the need for recalibration.

Then there are the four “also-rans” of the MMRCAs shoot out, beginning with the F-16 Fighting Falcon. Lockheed Martin offered India the customised F-16IN Super Viper, which is based on the F-16E/F Block 60. It has one enhanced high-thrust engine, the General Electric F110-GE-132A which can produce 32,500 lbf (144 kN) maximum thrust. This engine is derived from GE's highly successful F110 engine family that powers the bulk of F-16C/Ds worldwide.

The other American offering, the Boeing F/A-18E/F Super Hornet has twin General Electric F414-GE-400 turbofans, each with dry thrust 14,000 lbf (62.3 kN) and thrust with afterburner 22,000 lbf (97.9 kN). Sweden's contender was the Saab JAS 39 Gripen IN, an India-specific version of the Gripen NG, fitted with a single GE Aviation/Volvo Aero F414G engine. India's own Tejas Mk II light combat aircraft is planned to be powered by one GE F414-GE-INS6 engine.

Lastly, the Russian Mikoyan MiG-35 has twin Klimov RD-33MK afterburning turbofans with dry thrust 11,900

lbf (53.0 kN) each and thrust with afterburner 19,800 lbf (88.3 kN) each. The RD-33MK is the latest version of the RD-33 and is seven per cent more powerful than the base-line model. The engines can be fitted with vectored-thrust nozzles, which enable the MiG-35 to remain controllable for sustained periods in zero-speed and “negative-speed” (tail-forward) situations without angle-of-attack limitations.

TRANSPORT TRACKING

The other massive current IAF deal is for the Boeing C-17 Globemaster III—a large multirole military transport aircraft. The C-17 is powered by four fully-reversible Pratt & Whitney F117-PW-100 turbofan engines. The F117-PW-100 is the same as the commercial PW2040 fitted on the Boeing B757. It has an axial compressor, an annular combustor and an eight-stage axial turbine. Each engine is rated at 40,440 lbf (179.9 kN) of thrust. The thrust reversers direct air upward and forward, reducing the chance of foreign object damage and providing the ability to back the aircraft on the ground.

The IAF has already begun inducting the Lockheed Martin C-130J Super Hercules—a four-engine military transport aircraft. It is fitted with Rolls-Royce AE 2100D3 turboprop engines with Dowty R391 composite scimitar propellers. The engine is a two-shaft gas turbine with a 14-stage HP compressor driven by a two-stage HP turbine. The LP shaft, driven by a two-stage power turbine, drives the compound planetary reduction gearbox connected to the propeller. The engine was the first to use dual FADECs to control both engine and propeller. Each engine produces 3,458 kW (4,637 shp). The Rolls-Royce AE 2100D2 powers the new Lockheed Alenia C-27J Spartan medium airlifter.

The Airbus A400M is a large military transport aircraft under development, slated for first delivery in early 2013. It is fitted with four EuroProp TP400-D6 turboprop engines, manufactured by EuroProp International (EPI), a consortium formed by Rolls-Royce, ITP, MTU and Snecma. The compressor has five intermediate pressure (IP) stages and six HP stages.

FIGHTER ENGINE COMPARISON

Engine	Manufacturer	Fitted on	Number of Engines	Dry Wt Per Engine (lbs)	Thrust Dry (kN)	Thrust Reheat (kN)
F135	Pratt & Whitney	F-35 Lightning II	One	3,750	128.1	191.3
EJ200	EuroJet Turbo GmbH	Typhoon	Two	2,286	60	90
M88-2	Snecma	Rafale	Two	1,977	50	75.6
F110-GE-132A	GE Aviation	F-16IN Super Viper	One	4,050	N/K	144
F414-GE-400	GE Aviation	F/A-18E/F Super Hornet	Two	2,445	62.3	97.9
F414G	GE Aviation/ Volvo Aero	JAS 39 Gripen IN	One	2,445	62.3	97.9
RD-33MK	Klimov	MiG-35	Two	2,520	53.0	88.3

Source: Respective OEM's website and Wikipedia

AIR TRANSPORT ENGINE COMPARISON

Engine	Manufacturer	Type	Fitted on	No. of Engines	Dry Wt Per Engine (lbs)	Thrust/Power
F117-PW-100	Pratt & Whitney	Turbofan	C-17 Globemaster III	Four	7,100	179.9 kN
AE 2100D3	Rolls-Royce	Turboprop	C-130J Super Hercules	Four	1,925	3,458 kW
TP400-D6	EuroProp International	Turboprop	Airbus A400M	Four	4,167	8,250 kW

Source: Respective OEM's website and Wikipedia

**ENGINE POWER:**

F414 FROM GE AVIATION
(LEFT); M88-2 ENGINE
BY SNECMA

The turbine has one HP, one IP and three LP stages. Designed for optimum maintainability, a complete engine replacement can be done within four hours. The propellers on each wing turn in opposite directions, with the tips advancing from above towards the midpoint between the two engines. This is in contrast to the majority of multi-engine propeller-driven aircraft where propellers on the same wing turn in the same direction. It allows the aircraft to produce more lift, while lessening the torque and propeller wash on each wing. It also reduces yaw in the event of an outboard engine failure. Each engine develops 8,250 kW (11,000 shp). EPI claims that these are the largest turboprops ever made in the West. The world's most powerful turboprop is the Russian dual-turbine Kuznetsov NK-12MP that drives huge eight-bladed (four per propeller) contra-rotating propellers with maximum power output 11,033 kW (14,795 shp).

GREEN COMBAT

Over the decades, the military aviation industry has developed a bewildering array of advanced engines, each claiming to be of superior performance. However, as engines become ever more powerful, environmental concerns are correspondingly growing. Until now, combat aircraft have largely escaped the noise and emissions restrictions that civil aircraft are subject to, and their designers were free to concentrate on performance. But that's changing. Now that the era of cheap oil seems well and truly over, even military aero engine designers are keen to pursue more fuel-efficient designs.

In 2007, the USAF Research Laboratory awarded contracts to GE Aviation and Rolls-Royce to start developing new "green engine" technology. Although still in its early stage, the programme involves the adaptive versatile engine technology (ADVENT) and the highly efficient embedded turbine engine (HEETE) concept. It is now more commonly known by its joint name AD-HEETE and is intended to give the military's next-generation jet aircraft the ability to fly farther with less fuel. Its variable cycle core with an ultra-high pressure ratio combustor allows more air to bypass the engine during flight, letting the plane cruise without burning additional fuel. By controlling the airflow, the pilot can quickly shift from supersonic flight to subsonic cruising. A demonstration engine is expected to be ready for testing in 2013. If all goes according to plan,



it could deliver an efficiency jump of as much as 30 per cent.

Pratt & Whitney, whose star is in the ascendant following its F135 success, is also keen to develop a new family of military aero engines in the 20,000 to 35,000 lb class. Though information on the subject is still sketchy, these high-performance engines are likely to be based on a gearless version of the Pure-Power PW1000G geared turbofan series which is now under development for civilian aircraft like the Bombardier CSeries, Irkut MS-21 and Mitsubishi MRJ regional jet. Code named PW9000, a 30,000 lb thrust future engine could be developed for the fighter market. Among other possibilities, it would come in use to upgrade thousands of Boeing F-15s and Lockheed Martin F-16s. The new engine is expected to provide 18 per cent better fuel economy than the latest F100 series engines powering these fleets. Looking to the future, a PW9000 variant could also power the US Navy's next-generation air dominance fighter, projected to enter service after 2025.

Whatever else jet engines may be famous for, they are not quiet. Indeed the experience of a large fighter jet taking off with maximum afterburner engaged is not recommended for the faint-hearted. In 2008, it was rumoured that the F-35 would be twice as loud at take-off as the F-15 Eagle and up to four times as loud during landing. This alarmed residents near some proposed F-35 bases and they requested the USAF to conduct environmental impact studies concerning the plane's noise levels. It was later clarified that the F-35 noise levels are comparable to that of the F-22 Raptor and F/A-18E/F Super Hornet. Similarly, in response to criticism of its smoky predecessor engine, the Klimov RD-33MK engine is smokeless and includes systems to reduce infrared and optical visibility. In fact, with growing emphasis on stealth, efforts are on to reduce the aural and infrared signatures of other large military engines as well.

For its part, EPI has secured civil type certification for the EuroProp TP400-D6 turboprop powering the A400M transport aircraft. Reportedly, it is the first large turboprop engine to have been certified by the European Aviation Safety Agency (EASA) and the first military engine to have been certified by EASA to civil standards from the outset. This is a trend that is likely to continue. Apart from raw power, military aero engine designers will increasingly need to pay attention to green parameters. After all, the more fuel-efficient an engine is, the farther its reach and the longer its time on station—both crucial indicators of combat aircraft performance. **SP**

Our focus is to transform into a capability-based force rather than being adversary-centric

SP's Aviation (SP's): Having spent a major portion of your tenure at the helm of one of the largest and battle-tested air forces in the world, how have you tackled the major challenges facing the Indian Air Force (IAF)?

Air Chief Marshal P.V. Naik (CAS): The first major challenge was to add impetus to the transformation process, which was conceived keeping in tune with our doctrines and thought processes. At the macro level, this involves revamp of our strategies in order to maintain their relevance in the future scheme of matters. At the field level, we are focusing upon developing better employment tactics and training our personnel to operate these state-of-the-art technologies. We are also developing new infrastructure and upgrading the existing ones to operationalise the forthcoming assets right from the word go. Greater emphasis is being laid on interlacing our existing assets into the overall plan as our legacy systems will continue to be used in tandem with the newer ones for some more time in the future. In a nutshell, I would say that the IAF is passing through a crucial phase in its evolution. Induction of new weapon platforms, their integration into our plans, training of our personnel, upgrading our infrastructure, improvement in the service conditions and welfare of our personnel have remained my top priorities. I am glad that I had an excellent team to work with and have been able to achieve major milestones that we had set.

SP's: In previous interviews you had agreed with the general premise that the IAF is in the midst of a meta-morphic transformation. Could you elaborate on the change that is taking place, especially with regard to its ideology, doctrine, concepts, etc?

CAS: Defence forces, by nature of the job profile need to evolve continuously. Any doctrinal or professional inertia is suicidal and we cannot afford that. The evolution process spans the entire gamut of our existence. Revision of doctrines and strategies, required force structure, associated infrastructure development and training are aspects that need constant attention. The IAF's transformation to a potent and networked aerospace power basically hinges on three aspects. First, induction and integration of new technology weapon platforms and upgradation of the existing inventory. Second, induction and training of manpower to handle this new inventory while retaining our core competency in maintaining the existing ones and finally, the revision of concepts and doctrines. The upgradation of the existing weapon platforms, where viable, is undertaken to keep abreast with the advancement in technologies. All these platforms are being integrated through Air Force Network (AFNET), to attain net-centric capabilities in order to conduct effect based



Air Chief Marshal P.V. Naik took over as CAS in May 2009, and after having spent a major part of his career tackling challenges facing the IAF, will retire on July 31 this year. During an interaction with Air Marshal (Retd) V.K. Bhatia, Editor, *SP's Aviation*, the veteran fighter pilot spoke about various measures undertaken to build the necessary capabilities within the service. Read through the first part of the interview.

operations. Aspects related to human resource management are being planned through composite assessment of manpower. The training patterns have been upgraded keeping in view the envisaged requirements of the future.

SP's: Could you share the key ingredients of the latest revised doctrine of the IAF? How will these affect the IAF's war-waging and war-winning capabilities?

CAS: The Indian Air Force doctrine is the essence of our understanding of aerospace power. It portrays our perspective of employing aerospace power to meet our national security objectives. We have undergone a radical change in our thought process which is amply manifested through our doctrine. Our present focus is to transform into a 'capability-based force' rather than being 'adversary-centric'. Accordingly, the modernisation programme is being progressed to acquire capabilities that would enable us to undertake multi-front and/or multi-dimensional challenges. Just to give you an overview, the IAF's doctrine has two parts—'basic' and 'operational'. Part I of the doctrine is a guide on the basic aspects of aerospace power with inputs from old precepts and their subsequent evolution including amalgamation of space and its enormous force-enhancing impact. Part II covers the operational aspects of the employment of aerospace power. The doctrine is practised right down to the field level. Overall, evolution of any doctrine is a continuous process and same is the case for IAF which too would continue to evolve to suit future requirements.

SP's: During your tenure, you have on many occasions iterated that the IAF needs to be fully equipped and trained to fight across the entire spectrum of modern-day warfare. Could you describe the measures being undertaken to build the necessary capabilities within the service?

CAS: In this ever evolving global security scenario, one cannot accurately predict the kind of war we may have to fight in the future. As you can see, there has been a noticeable shift in the security scenario, both internal and external, with sub-conventional or asymmetric circumstances rising in prominence. Notwithstanding any external conventional threats that may arise, and for which we are adequately prepared, today we may have to employ high-end systems even at the lower end of the conflict spectrum. The armed forces, therefore, have to be ready to fight across the entire spectrum of modern-day conflict. This aspect becomes even more relevant as aerospace power is the preferred instrument of choice. To cater to the entire spectrum of conflict, the IAF has an all-round modernisation plan which caters to combat aircraft, transport aircraft, helicopters, weapon systems, AD systems, unmanned aerial vehicles; space enabled and network-centric capabilities, etc. Specific strategies are also being formulated and practised to counter the perceived threat scenarios.

The IAF has been a key partner with the DRDO and we have been encouraging indigenous design and development programme associated with the RPAs

SP's: What efforts are being made by the IAF to not only arrest the declining combat squadrons' strength but to restore/enhance it in the coming years?

CAS: Obsolescence is a phenomenon that air forces around the world confront on a regular basis due to the rapid advances in aviation-related technologies and their rapid obsolescence. We are currently at the cusp of our capabilities as some of our fleets are facing obsolescence. Procurement of assets like Su-30MKI, light combat aircraft, medium multi-role combat aircraft and fifth generation fighter aircraft are in the pipeline to enhance our combat potential. Some of our assets are being upgraded to make these contemporary, as far as the capabilities are concerned. Our focus also is to preserve and maintain our existing assets and this is being achieved with a well-conceived product and maintenance support plan. The modernisation programme of IAF is progressing well and IAF would continue to evolve as a modern, strategic aerospace power.

SP's: Could you give the latest update on the indigenous light combat aircraft (LCA) Tejas development/acquisition programme? Does the IAF feel satisfied with the performance of the initial operational clearance (IOC)/full operational capability (FOC) of Tejas Mk I? What are the shortcomings in operational capabilities that the IAF has had to contend with and how are these proposed to be overcome in the Mk II version?

CAS: As of now, we have seven LCA aircraft and these are being put through their final paces, before induction into the IAF this year. We are expecting two more limited series production aircraft to join the fleet by the third quarter this year. The LCA, in its present form, is a fourth generation aircraft and we are working with HAL to enhance its

capabilities. I am hopeful that the aircraft, in its final operational clearance configuration, will be a much more potent platform, to be a 'fourth generation plus'. We have had certain problems with the thrust-to-weight ratio and have contracted for a higher thrust engine for the LCA Mark II to obviate this problem. Some design improvements have also been planned to address the shortfalls in performance as compared to LCA Mark I aircraft.

SP's: What is the latest on the medium multi-role combat aircraft (MMRCA) programme and would your earlier assertion of the contract being signed before September this year likely to come true? When is the first MMRCA squadron likely to be inducted into the IAF? What are the chances of an upward revision for acquiring up to 200 aircraft under the MMRCA programme?

CAS: The Eurofighter Typhoon and the Rafale have been shortlisted. I am hopeful that the remaining processes will also happen as per our timelines. If there are no glitches, then the contract should get inked early. We expect to

induct the first MMRCa squadron into the IAF three years from the date of signing of contract. The option clause for procurement of additional MMRCa exists in the request for proposal (RFP), and a decision on this issue would be exercised by IAF subsequently.

SP's: Just like its combat aircraft fleets, the IAF appears to be in the midst of a crisis in terms of its obsolescent air defence weapons and support systems. What efforts are being made to correct the situation? When the indigenous Akash and the Israeli Spyder AD weapon systems are likely to be inducted to build up the requisite capabilities in this field?

CAS: The current surface-to-air missile (SAM) systems with the IAF may not be the latest, but are still very capable of thwarting challenges posed through the medium of air and space. We have started the process of replacing the surface-to-air guided weapons with modern, state-of-the-art SAM systems. The ageing Pechora fleet will be replaced by the new generation medium range (MR)-SAM system and OSA-AK System will be replaced by short-range (SR)-SAM system, which is a new generation low level quick reaction missile system being developed by the Defence Research and Development Organisation (DRDO) as a joint venture. In the interim, Spyder low-level quick reaction missile systems are being acquired to plug gaps in our low level air defence network. Spyder SAM System will be operationalised next year. The indigenous, state-of-the-art Akash SAM system will be inducted this year. It is an ongoing process and by 2022, the entire air defence (AD) cover will have new generation SAM weapon systems.

SP's: How is the IAF looking at the problem of replacing a large number of obsolescent ground-based radars to revamp its AD system? Also, what are the various types of radars likely to be inducted to give the IAF 'full-spectrum' radar surveillance capabilities?

CAS: Some of the radars on our inventory are reaching the end of their useful life and we plan to reinforce our AD cover with the induction of new radars and sensors. The induction of medium power radars has already commenced in March this year. These radars are expected to be operational by December 2012. IAF is also replacing the existing P-18, ST-68, Indra-I and Indra-II radars with indigenously developed Rohini radars. Some Rohini radars have already been inducted and are operational. All radars will be operational by 2014-15. Apart from these, we would be inducting multi-purpose rifle sight (MPRS), low level transportable radars (LLTRs) and low level light weight radars (LLWRs). The total percentage of legacy sensors in IAF hence would come down below 20 per cent by 2014-15. Plans are also afoot to set up a centralised command and control system by integrating these sensors through Integrated Air Command and Control Systems (IACCS). The recognised air situation picture (RASP) i.e. fused air picture of all military and civil sensors across the country will be available at designated places to control air operations. The inductions in the form of aerostats, airborne warning and control system (AWACS), airborne early warning and control system (AEW&C), LLWRs and mountain radars is expected to provide seamless coverage irrespective of the terrain, over the entire country.

This would greatly enhance our responses by way of reduction in the sensor-to-shooter loop.

SP's: Has the IAF received all the AWACS platforms initially contracted for? Has the AWACS been fully integrated into the IAF's operational environment and has it performed according to expectations? How has it changed IAF's operational thinking vis-à-vis fighting tomorrow's air wars? Are there plans to acquire more such or similar force-multipliers? Please elucidate.

CAS: We have received and are operating all the three AWACS and they are in the process of extensive operational employment and evaluation. The systems are working exceptionally well and to our satisfaction. Our operators are fully trained to exploit these advanced state-of-the-art systems. AWACS have expanded our information sharing loop and situational awareness, and it is now possible for us to prosecute our operations in a more effective manner. We also plan to acquire three AEW&C Systems from DRDO in the near future. In the long run, there are definite plans to procure additional AWACS.

SP's: The use of armed remotely piloted aircraft (RPAs) in the global war on terror (GWOT) has become more of a norm than exception. Does the IAF, which pioneered the acquisition and operational exploitation of the RPAs in the Indian context, have any plans to acquire similar capability? Could you throw some light on the DRDO autonomous unmanned research aircraft (AURA) being reportedly developed for the IAF which is stated to have the ability to carry weapons internally?

CAS: We are currently operating only unarmed RPAs though armed RPAs will come later in our context. The IAF has been a key partner with the DRDO and we have been encouraging indigenous design and development programme associated with the RPAs. AURA is currently under initial planning stages only and it would be premature to comment on its operational capability or payload capacity.

SP's: The IAF had reportedly benefited a great deal in the recent past by participating in a large number of international air exercises including the 'Red Flag', etc. However, of late, there appears to be a lull in such activities. Could you explain the reason for the 'draw down' and what policy the IAF is going to adopt in this regard?

CAS: Bilateral or multilateral exercises are mutually beneficial for all participants and not just the IAF. It will not be completely accurate to say that there is a lull in our participation in international engagements. We had joint exercises with France and UK last year and would be exercising with Oman this year. Our yearly engagement with Singapore continues, in addition to the Republic of Singapore Air Force (RSAF) participation in the GARUDA 2010 at France making it the first trilateral version of the exercise. Red Flag and Cope India with USA, Anatolian Eagle with Turkey and other exercises with friendly countries are all on the anvil. Having said that, it would be pertinent to add that bilateral exercises are limited by scope and thus lessons learnt are at the operational level. IAF is on its way towards upgrading its training facilities, like instrumented ranges, ACMI, etc and this would facilitate improvement in the scope and objectives of future exercises. SP

(To be continued)

COMING SOON:
THE CABINET COMMITTEE
ON SECURITY HAS
CLEARED THE BOEING C-17
GLOBEMASTER DEAL



PHOTOGRAPHS: SP GUIDE PUBLIS AND PIB

NO Slowdown

The US aerospace industry need not lose sleep over the so-called “missed opportunity” but rather get on with the task of pursuing many more lucrative opportunities that lie ahead

By Air Marshal (Retd)
B.K. Pandey, Bengaluru

UNDoubtedly, the ELIMINATION OF the Boeing F/A 18 Super Hornet and the Lockheed Martin F16 IN Super Viper from the race for the \$11 billion (₹49,500 crore) medium multi-role combat aircraft (MMRCA) tender floated by the Ministry of Defence in 2007 must have come as a bit of a surprise not only to the US aerospace industry but also to the American public at large and to many in India as well.

INDO-US STRATEGIC PARTNERSHIP

The process of large-scale acquisition of defence equipment even when executed through an “open tender” system, supposedly on account of financial imperatives, is often known to be influenced by political and strategic considerations. With the disintegration of the Soviet Union and the emergence of unipolar world, there have been profound geopolitical and geo-strategic changes. No longer afflicted by the shadow of Cold War politics, it was only to be expected that India and the US, the leading democracies in the world, should come together, not necessarily to form an alliance but as natural and equal partners in the newly emerging world order pursuing common goals and objectives. Thus it was that the era of Indo-US strategic partnership began under the leadership of George W. Bush. Perhaps the greatest manifestation of the

changing equations was the Indo-US Nuclear Deal that was pushed through aggressively by the US President against all opposition both at home and abroad. This sensitive agreement of historic prominence was in mutual economic and strategic interest of both the US and India and despite the involvement of international agencies, the speed as well as the ease with which the nuclear deal was finalised, was a clear testimony to the newly emerging relationship between India and the US besides a powerful message to the world.

Thus in an environment of the growing Indo-US strategic partnership, one would have been inclined to expect that if not the single engine Lockheed Martin F-16 IN Super Viper, the twin engine F/A-18 Super Hornet would surely be a front-runner in the race for the MMRCA contract. The fact that after four years of relentless effort, it turned out otherwise, would have been a cause of deep disappointment for the US aerospace industry. What is being viewed as a setback, rejection of the two combat aircraft in question would also have been a cause of considerable dismay for the US Government as the political leadership had provided full and explicit support. President Barack Obama himself had thrown his weight behind the American offer to further consolidate the Indo-US strategic relationship as well as to revive employment opportunities back home with attendant beneficial impact on the flailing US economy.

MISSED OPPORTUNITY

While the failure to win the MMRCA contract may lead to considerable despondency and a great deal of introspection within the US aerospace industry and the government, an objective analysis would reveal that even though the value of the lost contract has been labelled as \$10 billion (₹45,000 crore), with mandatory offset obligation pegged at a whopping 50 per cent amounting to \$5 billion (₹22,500 crore) applicable specifically to this tender, direct benefit in real terms to the US aerospace industry and to the US economy would be substantially lower. Further, the MMRCA tender is yet a long way from finalisation and given the number of imponderables on the way, the time frame for its finalisation and the ultimate induction as well as operationalisation of the aircraft cannot be predicted with any degree of certainty. Given the complexities of technology transfer and offset obligations, both being unfamiliar territory for the Indian Ministry of Defence, the MMRCA is likely to be plagued by uncertainty for a long time to come. The US aerospace industry therefore need not lose sleep over the so-called “missed opportunity” but rather get on with the task of pursuing many more lucrative opportunities that lie ahead.

PROCUREMENTS FROM THE US

Although the US aerospace industry has been associated with India for

over 70 years, the interaction was focused largely in the civil aerospace regime. The Indian military segment opened up to the US aerospace industry less than a decade ago. A catalogue of procurement of military aircraft from the US in the last few years would reveal that commencing at zero during the Cold War era, procurements have already reached a respectable level and the prospects of growth of business in the immediate and long-term for the US aerospace industry appear to be encouraging. In a deal with Boeing valued at \$1 billion (₹4,500 crore), the Indian Air Force (IAF) purchased three customised Boeing business jets for VVIP travel. These are already operational for some time now with the Delhi (Palam)-based Air Headquarters Communication Squadron. The second major acquisition has been of six C-130J Super Hercules for \$1.2 billion (₹5,400 crore). Delivery of the aircraft that are customised for special operations have already begun with the first aircraft which made its debut during Aero India 2011. Also, negotiations are in progress for the purchase of another six of the same type presumably for a similar price.

Meanwhile, orders have been placed in January 2009 for eight Boeing P-8I Poseidon long-range maritime patrol aircraft along with a host of weapon systems for the Indian Navy. This initial order is to be followed by another four and the total order is worth over \$3 billion (₹13,500 crore). Delivery of the aircraft is scheduled to begin in 2013. A \$900 million (₹4,050 crore) deal has already been concluded for the supply of 99 GE F414F engines for the Indian light combat aircraft (LCA) Tejas Mk II.

EQUIPMENT IN THE PIPELINE

Negotiations to purchase ten Boeing C-17 Globemaster III strategic military transport aircraft through the foreign military sales (FMS) route have been completed and it is understood that the \$4.1 billion (₹18,450 crore) acquisition

programme has been cleared by the Cabinet Committee on Security. With its phenomenal operational attributes, this fleet will bring about a qualitative change in the power projection capability of the nation. The IAF will, in all likelihood, bid for at least another six aircraft to build up its capability so as to fulfil the roles and responsibilities which have been bestowed upon it by an emerging regional power. Three other purchases which may fall in the share of the US aerospace industry are the requirement for 22 attack helicopters for the IAF, for which the Apache AH-64D is believed to be the front-runner, the requirement of the IAF for 15 heavy lift helicopters to replace the Mi-26, for which the CH-47F Chinook is in the race and the replacement of the ageing fleet of Sea King helicopters of the Indian Navy for which the Lockheed Martin MH-60 is under consideration. A fresh opportunity appears to be

Large-scale acquisition of defence equipment even when executed through an “open tender” system, supposedly on account of financial imperatives, is often known to be influenced by political and strategic considerations



STRATEGIC PARTNERS:
US PRESIDENT BARACK
OBAMA AND PRIME MINISTER
MANMOHAN SINGH DURING
THE FORMER'S INDIA VISIT

emerging for a deal through the FMS route to replace the engines of the fleet of Jaguar aircraft of the IAF for which the F125IN engine from Honeywell appears to be the favourite. Also, flight evaluation of the five types of basic turboprop trainer aircraft in the race against a requirement of the IAF has been completed and a vendor is expected to be selected in the near future. A total of 75 aircraft worth around \$900 million (Rs 4,050 crore) are to be bought off the shelf. It is understood that the US Hawker Beechcraft Corporation's T-6 Basic Turboprop Trainer aircraft is one of the leading contenders.

MARKET POTENTIAL IN INDIA

Three years ago, on the occasion of the anniversary of the IAF, the then Chief of the Air Staff, Air Chief Marshal Fali Homi Major had stated that "the IAF was in the process of an unprecedented transformation that would entail an investment of around \$100 billion (₹4,50,000 crore) for aircraft, equipment and infrastructure over the next two decades". As the Indian armed forces will continue to rely heavily in the foreseeable future on equipment and modern technologies from foreign sources, most of the latest aerial weapon systems and equipment would have to be procured from leading global aerospace majors. There is, therefore, considerable business potential for the US aerospace industry,

which without doubt, leads the world in cutting edge technologies. According to Vivek Lall, the erstwhile Vice President of Boeing Defense, Space, Security and Space in India, Boeing alone estimates a business potential of \$31 billion (₹1,39,500 crore) in India over the next 10 years.

FINAL WORD

But for the US aerospace industry to succeed, a number of important considerations need to be borne in mind. Firstly, the industry must compete with the latest technologies and not offer outdated equipment with no growth potential over an anticipated life cycle of four to five decades. Secondly, India should be treated as a "strategic partner" and not as an "ally". Regulatory provisions and intrusive policies formulated for allies therefore ought not to be automatically invoked in case of deals with India. Thirdly, as a customer, India ought to be a beneficiary of unrestricted and genuine transfer of technology. And finally, hopes of success of bids by the US aerospace industry against Indian tenders must not hinge solely on political support. After all, strategic partnership between the oldest and the largest democracies in the world cannot be founded on military hardware alone. **SP**

Its engines are on frontline fighters, like the F-15 Eagle, F-16 Fighting Falcon, F-22 Raptor and F-35 Joint Strike Fighter, as well as the C-17 Globemaster III military transport. Pratt & Whitney Canada has produced more than 73,000 engines, of which 47,000 engines are in service on over 25,000 aircraft in 198 countries.

Its large commercial engines power more than 30 per cent of the world's passenger aircraft fleet.

In an interview with *SP's Aviation*, Pratt & Whitney team outlines the company's presence in India.



Flying Power

SP's Aviation (SP's): The IndiGo order for 300 Pratt & Whitney PurePower PW1100G engines is a record-breaking order for P&W? What is the value of the deal?

Pratt & Whitney (P&W): Pratt & Whitney is very pleased that IndiGo selected the PurePower PW1100G engine for its order of 150 A320neo aircraft. The order, which represents 300 Pratt & Whitney PurePower PW1100G engines, is the largest commercial order for the company in nearly 50 years. Financial terms of the deal have not been released.

The first PurePower PW1100G engines will be delivered to customers by late 2015. Airbus recently announced that the Pratt & Whitney engine is the lead engine to enter service on the A320neo family in October 2015.

SP's: Which other aircraft manufacturers and airlines

By R. Chandrakanth

have opted for PW1100G engines across the globe?

P&W: We've won four applications for PurePower engines: the Mitsubishi Regional Jet (13K lbs to 17K lbs), the Bombardier CSeries (19K lbs to 24K lbs), the Airbus A320neo and our single-aisle engine for the Irkut MC-21 (24K lbs to 33K lbs).

Pratt & Whitney now has more than 1,200 PW1000G engines on order, including options.

International Lease Finance Corporation (ILFC), IndiGo and Lufthansa recently selected the Pratt & Whitney PurePower PW1100G engines for A320neo family aircraft orders.

PurePower customers for the Bombardier CSeries include Lufthansa, Lease Corporation International (LCI), and Republic Airways. ANA and Trans States Holdings are PurePower customers for the Mitsubishi Regional Jet (MRJ).

SP's: In India, how many aircraft are powered by P&W engines and what is the market like?

P&W: Pratt & Whitney has been partnering with the Indian aerospace community for over six decades. More than 300 aircraft are flying in India with Pratt & Whitney and International Aero Engines. We recognise the importance of this growing market and the number of potential partners to help stimulate that growth.

India will need more than 1,000 commercial aircraft over the next 20 years according to Airbus and Boeing and India's growth in the industry is driven by low-cost carriers like IndiGo, SpiceJet and GoAir. The Indian market is dynamic with many changes taking place. It is an exciting time to be a part of this important market.

Our largest customers for Pratt & Whitney and IAE en-

turing engine parts in India? Which are the companies and what parts are being looked at from India?

P&W: Pratt & Whitney is in the advanced stages of forming several joint ventures with major local businesses. The joint ventures will support the manufacturing of engine components in India.

SP's: Besides Air India, who are the other clients of the P&W engine wash facility in Mumbai? Could you indicate the benefits of the facility?

P&W: Air India currently uses Pratt & Whitney's patented, environmentally-friendly EcoPower engine wash at its Mumbai International Airport-based service centre. As an EcoPower engine wash franchisee, Air India offers the service to other carriers in the region and is able to perform washes on



AROUND THE WORLD:
PRATT & WHITNEY ENGINE
ON C-17 GLOBEMASTER III

gines are Air India, Kingfisher and IndiGo, with close to 300 large commercial engines in service for all customers in India.

SP's: Some of the engineering work for the GTF engine is being done in India with Infotech? Could you give some details of the same?

P&W: Pratt & Whitney established a long-term business relationship with the engineering and information technology firm Infotech Enterprises Ltd in Hyderabad in 2000. Infotech and our other partners in India are helping us develop innovative, new, environmentally-friendly products.

Pratt & Whitney has 16 aerospace suppliers in the country. The idea is to develop an aerospace ecosystem by developing aerospace capabilities in India.

SP's: Could you tell us about your meeting with major Indian companies to form joint ventures for manufac-

nearly all commercial engines in service today.

There is an increasing demand for services like EcoPower engine wash with environmental and bottom line benefits. As one of the fastest growing aviation markets in the world, the demand is expected to significantly increase in India. Air India has the ability to grow its wash capacity to meet the market's increasing demands.

Till date, Air India has performed more than 205 EcoPower engine washes saving more than 8,80,000 gallons of fuel worth \$3.1 million (₹13.95 crore) while reducing its CO₂ emissions by approximately 8,700 metric tonnes.

Air India expects to save \$9 (₹40.5 crore) million in fuel costs (2.6 million gallons of fuel) and reduce its CO₂ emissions by 25,000 metric tonnes annually with EcoPower engine wash.

Here are some of the benefits of the EcoPower engine wash:

- **Clean:** Pure atomised water provides a more thorough airfoil cleaning than conventional methods; closed



SAVING FUEL: ECOPOWER ENGINE WASH ON AN AIRCRAFT (LEFT); F117-ECOPOWER ENGINE WASH EQUIPMENT (RIGHT)

loop system captures effluent as it exits the engine making it environmentally safe

- **Green:** Reduces engine CO₂ emissions; uses no detergent
- **Smart:** Reduces fuel consumption by as much 1.2 per cent saving customers money; increases exhaust gas temperature (EGT) margin by as much as 15 degrees celsius for longer revenue service time
- **Fast:** Simply park, wash, fly; washes take 60-90 minutes and are done while the aircraft is parked at the gate
- **Versatile:** Can be performed on all engine models (P&W, GE, IAE, CFM and RR, commercial, military, small and large)

SP's: The GTF is expected to generate substantial cost-savings (\$1.5 million [₹6.75 crore] per aircraft per year), what else does it offer?

P&W: Pratt & Whitney's technology investment in the PurePower geared turbofan (GTF) engine produces the only proven new engine architecture for now and well into the future. It's real and currently undergoing extensive ground testing with first test flights scheduled for mid-year.

The PurePower PW1000G engine takes a comprehensive approach to engine development. Unlike our competitors, who are focusing primarily on the thermal efficiencies derived from improvements to an engine's core, Pratt & Whitney is upgrading the propulsive and thermal efficiencies of the engine. To do this, the PurePower engine uses an advanced gear system allowing the engine's fan to operate at a different speed than the low-pressure compressor and turbine. The combination of the gear system and an all-new advanced core delivers double-digit improvements in fuel efficiency and environmental emissions as well as a 50 per cent reduction in noise.

SP's: Analysts have also pointed out that PW6000 engine is burning about six per cent more fuel than original



estimates on A318. Is that still an issue and will there be any deviation from the 15 per cent less fuel burn estimate for PW1100G?

P&W: The PW6000 engine specific range trends are on track or slightly better than the Airbus A318 'Orange Book' performance handbook. The PW6000 engine is also demonstrating excellent revenue service performance retention characteristics.

SP's: What about the use of alternative jet fuel usage on your engines? What are the developments in this area?

P&W: Pratt & Whitney is a leader in the research, certification and demonstration of alternative fuels. We have been working with many customers and airframe manufacturers as well as with government agencies, to provide alternative fuel options that improve fuel supply and reduce emissions. We led a cross industry team of engine manufacturers that updated the current fuel specification guide. This new global industry standard outlines the steps required to safely and economically evaluate and certify any alternative fuel for use in aviation. We expect all of our commercial, business and military engines to be certified for biofuel use.

SP's: Can you tell us about P&W engines for military aircraft, globally as well as with reference to Indian aircraft acquisitions?

P&W: P&W's F117 engine, exclusive power for the C-17 Globemaster III, will be the first P&W military engine in India. Pratt & Whitney's F117 engine team is working closely with Boeing to support introduction of the C-17 Globemaster III aircraft in India. The C-17 is a workhorse, performing extremely well supporting military and humanitarian operations around the world and has one of the highest mission-capable rates for airlifters. C-17's international customers include the United Kingdom, Australia, Canada, NATO, Qatar, etc. UK has seven C-17s; Australia has five (one is on order); Canada has four; NATO Airlift Management Agency (NAMA) operates three; and Qatar has two. SP

By Our Special Correspondent

A record number of visitors, including 12,751 attendees from 108 countries, an increase from last year's 11,186, and a record 511 exhibitors, exceeding the previous high mark of 445 companies were present at the European Business Aviation Convention and Exhibition (EBACE) 2011 making it the second-highest total ever.

all BUSINESS

THE BUSINESS AVIATION MARKET is burgeoning and this was visible at the eleventh edition of the European Business Aviation Convention and Exhibition (EBACE) 2011. "A record number of visitors, including 12,751 attendees from 108 countries, an increase from last year's 11,186, and a record 511 exhibitors, exceeding the previous high mark of 445 companies were present, making it the second-highest total ever," claim the organisers.

An annual business aviation event, EBACE 2011, jointly hosted by the European Business Aviation Associa-

tion (EBAA), the leading association for business aviation in Europe and the National Business Aviation Association (NBAA), the leading voice for the business aviation industry in the United States, was a three-day event organised from May 17 to 19 at the superb Geneva Palexpo and Geneva International Airport.

The event celebrated 11 years of partnership between EBAA and NBAA in hosting the event. It also showcased the ample opportunity in business aviation and related business; creating job openings and economic opportunity around the world. Besides exhibits including incredible static display of

PHOTOGRAPHS: DASSAULT AVIATION, EBACE AERO AND EMBRAER





LATEST INNOVATIONS:
STATIC DISPLAY OF AIRCRAFT
(TOP); ORGANISERS AT THE
INAUGURATION CEREMONY
(RIGHT)

aircraft, learning sessions and maintenance and operations sessions were also organised during the event.

ON DISPLAY

Rockwell Collins featured its latest innovations for advanced operations with its largest presence at EBACE 2011. One key feature of the show for Rockwell Collins was the introduction of Ascend European Union (EU) regional trip support (RTS)—a suite of flight support, maintenance operation and cabin services for European flight departments.

Cessna Aircraft Company displayed its latest version of the Citation X at the show before beginning a European demonstration tour. The Citation X on display featured the newly certified Honeywell Primus Elite avionics suite, new cabin management system and winglets. Cessna's new Citation X is due to make its first flight later this year ahead of certification in the first half of 2013, with delivery following in the second half of 2013.

Airbus showcased its two largest corporate jets, an Airbus ACJ and an A320 Prestige, both of which were exhibited for the first time. The Airbus ACJ is operated by K5-Aviation GmbH and features a cabin completed by Fokker Services that features seating around tables, a lounge area, a private office/bedroom with ensuite bathroom and shower. The new Airbus A320 is managed by Comlux and is available for VVIP charter.

The first aircraft outfitted by Comlux America, an Airbus ACJ320 that features an outstandingly quiet cabin, was displayed at the EBACE show in Geneva, allowing potential customers to see its unmatched comfort, space and freedom of movement at firsthand.

Bombardier's six of the high-performance Learjet, Challenger and Global business jets were on static display at the show, highlighting Bombardier's comprehensive aircraft range—the widest product offering of all business jet manufacturers. The aircraft showcased were Learjet 45 XR air-



craft, Learjet 60 XR aircraft, Challenger 300 aircraft, Challenger 605 aircraft, Challenger 850 aircraft, and the Global 6000 aircraft.

WHAT'S NEW?

Eurocopter's EC145 Mercedes-Benz Style helicopter, which features an easily transformable interior and is tailored for high-end corporate, executive and private operations, made its world debut at EBACE 2011. The first rotary-wing aircraft was displayed prior to its delivery to a European customer.

Dassault Falcon launched the Falcon 2000S, bringing a large cabin aircraft to the super mid-sized business jet market. It is offering category-leading payload, range, performance and efficiency. The 3,350 nm Falcon 2000S will feature inboard slats, high-Mach blended winglets, a new generation PW308C engine that produces fewer emissions, an entirely new BMW Group DesignworksUSA interior and redesigned cockpit aesthetics along with the next-genera-





tion EASy II flight deck. The Falcon 2000S is expected to be certified by the end of 2012 with deliveries beginning in early 2013.

ANNOUNCEMENTS

At the EBACE, Embraer and Portugal's Ricon Group announced a contract for the acquisition of one Phenom 300 executive jet for its newly created subsidiary Everjets. Everjets plans to start operations with the aircraft in December 2011 in Southern Europe. The Phenom 300 will be available for charter, offering Everjets discerning passengers a striking new product for their travel needs.

Embraer and Comlux The Aviation Group announced a contract for the acquisition of three large Legacy 650 executive jets for the Fly Comlux Division, in Kazakhstan.

Rockwell Collins, the first to deliver high-definition (HD) cabin management systems to business aircraft, is now introducing a digital HD upgrade to aircraft equipped with its ACMS and CMS-1 cabin management systems.



LARGE PARTICIPATION:
DASSAULT AIRCRAFT ON
DISPLAY (LEFT); A BUSINESS
MEETING DURING THE EVENT
(TOP)

CONFERENCES & SYMPOSIUMS

Several conferences and seminars were organised which covered a variety of international and local aviation issues. Panels of industry experts discussed steps taken by the business aviation communities to meet their environmental stewardship goals, on various policy issues affecting business aviation. Additional sessions covered operational safety, and the latest upgrades to the aircraft and technology.

AWARDS

Former Biggin Hill Airport Director Peter Lonergan and Comlux Aviation Group President Richard Ganoa were presented the 2011 European Business Aviation Awards. The awards were presented during the opening day. This year's award recipients have both championed business aviation for decades.

During his tenure as Biggin Hill Airport Director since 1994, award winner Peter Lonergan turned the facility, which was once scheduled for closure, into a thriving general aviation airport. He now plans to represent EBAA and its members as the business aviation representative at the European Aviation Safety Agency's Rulemaking Group on Requirements for Aerodrome Operations.

Award recipient Richard Ganoa has been with Airbus for more than 25 years and the Airbus Corporate Jetliner. During the eight years when he was leading the programme, more than 120 of the aircraft were sold. As President of the Comlux Aviation Group, he has expanded the company's service offerings, opened new facilities across the globe and more than tripled the number of aircraft the company owns and operates. He was also a founding member of the Middle East Business Aviation Association.

EBACE 2012

The 12th edition of EBACE will be held again at the Geneva Palexpo from May 14 to 16, 2012. [SP](#)

CENTENARY VOYAGE

Indian civil aviation needs \$30 billion (₹1,35,000 crore) investment, said Civil Aviation Secretary Dr Nasim Zaidi at the “Centenary Conference of Indian Civil Aviation,” organised by ASSOCHAM and MoCA

THE EXPONENTIAL GROWTH OF the Indian civil aviation sector needs investments worth over \$30 billion (₹1,35,000 crore) in the next 15 years and the Ministry of Civil Aviation (MoCA) has worked out a roadmap to facilitate this, announced the Secretary of Civil Aviation, Dr Nasim Zaidi.

Inaugurating the “Centenary Conference of Indian Civil Aviation,” organised by the Associated Chambers of Commerce and Industry (ASSOCHAM) and the Ministry of Civil Aviation, Dr Zaidi outlined three key initiatives taken up by the Ministry during the year— creation of a national registry of airports;

By **R. Chandrakanth**

tion sector, on the regulatory front, the dominance of the US and Europe continued. Aviation as a business faces significant regulatory constraints and there was need to revisit the issues for global standardisation.

The outlook for the sector was quite dampening as crude oil prices were over \$120 (₹5,400) a barrel. Oil price volatility impacts the aviation sector, more so in India due to the high taxation regime.

AIRLINE PERSPECTIVE

The conference deliberated on three issues—“Airports: Constraints and Growth Drivers”; “Airlines Industry: Challenges



AT THE CONFERENCE: INDIGO PRESIDENT ADITYA GHOSH RECEIVING THE AWARD FROM ZAIDI; AIR MARSHAL (RETD) B.K. PANDEY ADDRESSING THE CONFERENCE

formation of a civil aviation authority; independent investigation board among other developmental initiatives.

The passenger growth has been phenomenal at 23 per cent in 2010-11, up from 19 per cent the previous period. Only two per cent and 0.5 per cent Indians fly domestic and international, respectively. Though we are way behind, there is huge potential. The growth of the sector is critically dependent on infrastructure, safety, liberalisation, human resources and environment.

The Director General of Association of Asia Pacific Airlines (AAPA), Andrew Herdman, said while the Asia-Pacific region was doing well commercially in the avia-



and Opportunities”; and “Training and Capacity Building”, with a host of experts giving their perspectives.

The refrain of the top airline executives was on the perception of those in the bureaucracy and also the people at large that the airline business was a highly profitable one. Top airline honchos—Saroj K. Datta, Executive Director of Jet Airways; Aditya Ghosh, President, IndiGo; Sanjay Aggarwal, CEO of Kingfisher Airlines; Kaushik Khona, CEO, GoAir; Tom Wright, General Manager (India), Cathay Pacific Airways and Captain Pankaj Chopra, Vice President (Flight Safety), Religare Voyages, were on the same page on “how everyone associated with the aviation industry makes money, except the airlines”. The profit-margins are wafer-thin.

UNDER-SERVICED MARKET

India being a highly under-serviced market, they were optimistic about the opportunities, but the challenges were many—infrastructural issues; high taxation; undue regulation; human resource requirements, etc.

The joke that Emirates is India's national carrier is a matter of concern, but which Indian airline has the balance sheet to compete with them, questioned Sanjay Aggarwal. "Weaker balance sheets are a result of punitive tax structure; higher fuel prices; exorbitant airport charges," he said and hoped that there would be a rational cost structure. Further endorsing this, Aditya Ghosh sought 'unshackling' of the regulatory industry and an active programme for Indian airlines to take a bigger share of the global market.

Kaushik Khona said an auto rickshaw driver charged ₹6.50 per km, while it was ₹4 per km for airlines and yet it was perceived that airlines overcharged customers. There was need to revisit foreign direct investment (FDI) so as to allow access to funds. Taxation, he lamented, had crippled the industry and it was a 'crime to make profits'. "If by mistake an airline made profit, then it has to pay minimum alternative tax (MAT)," he jocularly remarked.

With regard to the general aviation sector, Captain Pankaj Chopra said that in the metros the airspace was getting congested and called for development of satellite airports. General aviation needed to be viewed differently by the regulator. Also there was need to set up a joint regulatory committee for non-scheduled and general aviation operators.

Embraer's Regional Sales Director, Chuck Pulakhandam forecast that secondary markets would overtake primary markets by 2012, requiring the 'right size' aircraft. Giving a perspective on seat configuration and business prospects, Chuck Pulakhandam pointed out that in the 250-seat category, there were mixed operators accounting for 27 per cent business; between 50 and 250 (mostly aircraft with 70 to 120-seat configurations) the percentage was 51; and between 20- and 50-seat, the percentage was 22 per cent. The 70-120-seat aircraft market, he added, was growing, and that Embraer was perfectly positioned to offer airlines the 'right' aircraft for the 'right' destination.

SUNRISE INDUSTRY

Saroj Datta said 100 years of civil aviation meant a continuous journey and that the industry in the last two decades has been witnessing enormous growth. "It is a sunrise industry and it will take time for all airlines to become profitable. It is the only industry which does not work on economic principles."

On the competitive edge on turboprop and regional jets, Chuck Pulakhandam said that as the road network in India was improving (Bengaluru to Mysore about 150 km, could be covered by road in two hours), viability of short haul flights would get affected. Travelling to the airport, early check-in, etc would make road travel faster and inexpensive.

In the session on "Airports: Constraints and Growth Drivers", the panelists included Vidya Basarkod, CEO, Reliance Airport Developers; I.P. Rao, CEO, Delhi International Airport Limited, GMR; Suresh Goyal, Managing Director, Macquarie SBI Capital Infrastructure; Bhaskar Bodapati, Director (Finance), GVK-BIAL; Sanjay Varkey, CEO, Shell MRPL Aviation Fuels and Ansgar Sickert of Fraport India. In the light

of the growth potential, the consensus was that there was need for a stable regulatory environment and initiatives to drive growth. "Airport financing is not a constraint; the challenges are with the regulations."

STRUCTURED TRAINING ESSENTIAL

The session on "Training and Capacity Building," which was chaired by Air Marshal (Retd) V.K. Verma, Director, Indira Gandhi Rashtriya Udan Academy, included Air Marshal (Retd) B.K. Pandey, Editor of *SP's Airbuz*; and Ajay Bhatnagar, Inspector General, Central Industrial Security Force. The salient point was immediate standardisation of the training procedures.

Air Marshal Verma underscored the importance of training, throwing light on the work done at the Academy. Agreeing that there was a vast pool of talent within the defence forces that could be utilised for training in civil aviation, he said synergies need to be built. The demand for trained personnel in the region was extremely high and that the Academy had doubled its capacity from last year.

In his presentation on "Civil Aviation Training in India", Air Marshal Pandey highlighted on the aspects of capacity building and quality assurance. With the surge in demand for pilots and other aviation professionals, training institutions mushroomed without adhering to quality, impacting adversely the industry. He suggested remedial measures that included limiting the number of training institutions to five; structured training programmes; synergy with the IAF among other things. One of the most serious impediments, he remarked, has been resistance to change.

AWARDS

On the occasion, H.S. Khola, former Director General of Civil Aviation (DGCA) presented the best in-flight service and safety award to Kingfisher Airlines; best overall performance to IndiGo; best Indian global carrier to Jet Airways; best managed airport to Indira Gandhi International Airport; best training institute to Frankfinn; and the best cargo airline award to Deccan 360. SP



**SECONDARY MARKETS
WOULD OVERTAKE
PRIMARY MARKETS BY
2012, REQUIRING THE
'RIGHT SIZE' AIRCRAFT.
—CHUCK
PULAKHANDAM,
REGIONAL SALES
DIRECTOR, EMBRAER**

*for more information and photographs, visit:
<http://spsaviation.net/news/?id=85>*



RFP Stalled

After several years of effort, tender for the 197 utility helicopters for the Indian Army was called off virtually in the last minute.

RFP for 22 attack helicopters for the Indian Air Force was cancelled as ostensibly none of the machines in the race could meet all the stipulated qualitative requirements.

SINCE THE MIDDLE OF the last decade when the “open tender” system under the Defence Procurement Procedure (DPP) for the purchase of military hardware was introduced, cancellation of tenders by the Ministry of Defence (MoD) appears to have become a routine affair. After cancelling the tender for artillery guns for the Indian Army five times, the government may have no option but to follow the government-to-government route also referred to in the American system as foreign military sales (FMS). After several years of effort, tender for the 197 utility helicopters for the Indian Army was called off virtually in the last minute. Request for proposal (RFP) for 22

By Air Marshal (Retd)
B.K. Pandey, Bengaluru

attack helicopters for the Indian Air Force (IAF) was cancelled as ostensibly none of the machines in the race could meet all the stipulated qualitative requirements (QRs). The most recent case of cancellation of tender pertains to the RFP for a new engine for the fleet of Jaguar aircraft for the IAF.

Of the fleet of Jaguars described as deep penetration strike aircraft (DPSA), acquired for the IAF in the late 1970s from the UK, around 125 remain in service. During its over three decades of existence in the IAF, the fleet has undergone a number of modifications to sustain its operational relevance and has rendered yeomen service all these years as the primary strike aircraft of the IAF. However, the ageing

JAGUAR: RFP FOR A NEW ENGINE HAS BEEN CANCELLED

fleet has for some time now been badly in need of major mid-life upgrade to remain as a frontline aircraft in the combat fleet of the IAF. The aircraft currently powered by two Adour Mk 811 turbofan engines provides a rather unfavourable thrust to weight ratio and hence is inherently underpowered. This feature has an adverse impact on the performance envelope especially in the demanding hot and high operating environment in India. Thus, apart from the upgrade of avionics and other systems, the Jaguar fleet of aircraft of the IAF needs new and significantly

Royce offer could therefore be considered to be technically non-compliant. However, the Adour Mk 821 offered certain advantages. Firstly, it was a product of proven technology and has a high degree of commonality with two other engines from the same company in use in the IAF—the Adour Mk 871 turbofan fitted on the Hawk Mk132, and its predecessor, the Adour Mk 811 turbofan engines that power the Jaguar fleet.

As compared with the engine currently fitted on the Jaguar, the F125IN turbofan from Honeywell delivers 30 per cent higher thrust. Honeywell claims that the F125IN would offer “improved pilot safety, lower maintenance costs and outstanding reliability.” Honeywell also claimed that as compared to its competitor, the modular construction of the F125IN and its integral dual full authority digital engine control (FADEC) system would provide substantial savings to the operator in life-cycle costs. It is however not clear whether or to what extent, an ageing airframe will be able to fully and gainfully exploit the significantly higher level of thrust the two F125N engines are capable of delivering.

The F125IN was successfully demonstrated on the ground to the IAF in Bengaluru in 2007 fitted on a Jaguar aircraft of the IAF. Honeywell has moved forward since then acquiring its own Jaguar airframe and has completed design of its standard engines for production. The company is now ready for flight demonstration and is in a position to compete for the contract for re-engining of the Jaguar fleet. But as it turns out, owing to the technical anomaly, Rolls-Royce opted to withdraw from the contest rather than be eliminated. Although this has paved the way for Honeywell to emerge as the preferred vendor, a voluntary withdrawal prior to the submission of response has resulted in a “single vendor situation”. Now, as dictated by the provisions of the DPP, the MoD has been compelled to withdraw the RFP.

With the situation having gone back to square one, the IAF now has three options before it. The first is to make a fresh proposal and re-tender with suitably modified technical parameters. Undoubtedly, the process will be time-consuming and the protracted negotiations would only diminish the residual airframe life of the Jaguar fleet of the IAF. Besides, there is always the possibility of the “single vendor” situation arising once again bringing the process to a grinding halt. The second and possibly a more expedient option may be to follow the FMS route that would obviate the need for “open tender” and inviting bids from a number of vendors. Recent history of deals pertaining to the procurement of defence equipment indicates that the FMS route has the best chance of successfully inducting urgently required defence hardware. The examples are procurement of six C-130J Super Hercules; three Boeing business jets; and eight Boeing P-8I long range maritime patrol aircraft. Another major acquisition recently approved is the first batch of 10 C-17 Globemaster III strategic military transport aircraft.

In the case of the engine for the Jaguar fleet, as there appears to be only one engine available in the market—the Honeywell F125N, the FMS route may, in the final analysis, be the most prudent, practical and viable option. Opting for the “open tender” system under the DPP therefore would turn out to be no more than an interminable wild goose chase. The third option is to scrap the re-engining programme for the Jaguar fleet and gradually phase out the aircraft, an option that may not be readily acceptable to the IAF. **SP**



more powerful engines in place of the Adour Mk 811s for enhanced performance as a platform.

With the aim to gainfully utilise the residual airframe life of 10 to 15 years or so, a decision was taken a few years ago to replace the Adour 811 engines with more powerful ones. Thus, an RFP for new engines of higher thrust was issued by the MoD on November 26, 2010, to two of the engine manufacturers—Rolls-Royce, the supplier of Adour 811 engines currently fitted on the Jaguar aircraft of the IAF and to the American aerospace major Honeywell that produces the F125IN which is regarded as a possible replacement. The deadline for submission of response to the RFP was April 22 of this year.

Rolls-Royce initially offered the Adour Mk 821 which in fact is only an upgraded version of the Adour Mk 811 and although it can deliver higher thrust, it is not actually a new engine. In the strictest sense, there is a possibility that the Rolls-

APAC has limited influence in regulatory procedures



Andrew Herdman, Director General, Association of Asia Pacific Airlines (AAPA), has been campaigning for standardisation of regulatory procedures with inputs from the APAC region. Herdman was in Delhi recently for the conference organised as part of the centenary celebrations of Indian civil aviation. In an interview with *SP's Aviation*, Herdman talks about the issues that need to be addressed urgently. Excerpts from the interview.

SP's Aviation (SP's): You have mentioned how the US and European Union regulations dominate the global airline sector and how the Asia-Pacific region needs to contribute in this regard, could you give specific instances?

Andrew Herdman (Herdman): As there is a global emphasis on safety, security and environmental concerns, the need to have globalised regulatory mechanisms cannot be overstated. It is true that the US and Europe have been in the forefront when it comes to regulatory policies and there certainly are gaps as the issues in Asia are not factored in. Take accident investigations for instance and the need to standardise is urgent. I am happy that India's Civil Aviation Secretary Dr Nasim Zaidi has mentioned about setting up of an independent investigation board which will be compliant with the norms of the International Civil Aviation Organisation (ICAO). There is need to raise global standards on safety and security and this can happen only when there is widespread participation.

Right now, safety is led by the Federal Aviation Administration of the US and the European Union, both driven by domestic political concerns. All harmonisation efforts focus on US-EU differences. The current regional challenges include responding to growth and assuring skill and resource levels; SSP and SMS implementation including 'just culture' and runway safety.

SP's: What are the issues that need urgent attention of policy makers?

Herdman: Security is one. Right now, in most countries security at airports is good, however, passenger screening is getting extremely costly with rapid induction of sophis-

ticated technologies. We are taking decisions when we are fearful and this in itself may prove to be counter-productive. We should avoid overreacting. There has to be a balance between screening innocent passengers and intelligence gathering to track down terrorists and other elements. We need to relook at passengers carrying liquids and gels. While security is important, customer service of airline passengers is also key and this calls for enormous training. Strict security prevails at airports around Asia and this drives up the overall cost on society both in terms of time and money.

The other important issue is that of environmental impact of the airline industry. There is no abatement in consumption of fuels, though we keep hearing on how fuel-efficient aircraft have become.

SP's: As an Asia-Pacific association, what is your reading of the airlines sector in India?

Herdman: China and India have been growing at quite a pace since 2000 and we have seen the emergence of G-20 from G-7. Aviation is a catalyst for growth, but the outlook is to be cautious. With oil price volatility and its effect in India is being more due to taxes, global recovery itself will be hampered. It is heartening to note that there is tremendous growth of passenger movement, but cargo has been neglected. You need a dynamic cargo sector, the way Hong Kong and Dubai have emerged as both passenger and cargo hubs in the region. The Asia-Pacific region had 684 million passengers, 18 million tonnes of cargo, accounting for 30 per cent of global passenger traffic and 44 per cent of global cargo traffic. India's contribution in air cargo has been negligible.

SP's: What are the challenges for the sector in Asia?

Herdman: It will be that of managing the growth. Infrastructure, skilled manpower, deployment of right technologies, etc have to keep pace with the growth projections. There has to be constant capital investment in fleets, airports and other infrastructure. The Delhi airport is impressive and I understand that the government has plans for airport modernisation across the country and this augurs well. SP

—By R. Chandrakanth

FRENCH MINISTER visits India pitches for DASSAULT RAFALE

WITHIN A MONTH OF India short-listing Dassault Rafale and Eurofighter Typhoon for the \$10.4 billion medium multi-role combat aircraft (MMRCA) programme of the Indian Air Force (IAF), French Defence Minister Gerard Longuet came on a two-day visit to India pitching for the French Rafale. Longuet said that the Rafale has a unique distinction. "We have one single speaking partner (Dassault) instead of four partners (as with Eurofighter)," he said.

Speaking to the media, the Minister said that buying French military equipment was attractive as it is accompanied by transfer of technology. "The French Government gives buyers of military hardware the commitment that equipment and spares will always be available and that it will provide upgrades as technology evolves," he said.

India expressed concern to the Minister over the sale of French military hardware to Pakistan in the name of fighting terror. Later addressing the press, Longuet accepted that the issue was raised during the meeting with his Indian counterpart A.K. Antony. He said that his country had sought clarifications from Islamabad.

Stressing on the growing Indo-French strategic relationship, Longuet said that France views India as a stabilising force in a volatile region and fully supports India's bid for a permanent membership in the United Nations Security Council.

Responding to a question on the nature of France-Pak-



istan relations after the killing of Osama bin Laden, the French Minister said terrorism could not be the weapon of anyone or any government and Paris was awaiting the outcome of the dialogue between Washington and Islamabad.

With regard to the delays in construction of six French Scorpene submarines in Mazagon Docks, the Minister said that the programme was on course and the initial delay was because the dockyard had to be modernised to build the submarines. The first submarine is expected in 2015.

Besides MMRCA, France is also awaiting the decision by the Indian Government to clear the \$2.1 billion Mirage 2000 fighter aircraft upgradation programme.

Defence ties between India and France have drawn closer in the past few years. Stressing on this, Longuet said that while engagement between the defence industries of both countries is decades old, the nature of ties with the military is growing. He announced that soon the armies of both countries would undertake a joint exercise, namely Exercise Shakti, similar to the bilateral Garuda Exercise between the two air forces and Varuna Exercise between the two navies.

Longuet's visit is being seen as yet another important initiative in the Indo-French strategic partnership, after the visit of French President Nicholas Sarkozy in December 2010. **SP**



GERMAN CHANCELLOR
reviews security scenario

GERMAN CHANCELLOR ANGELA MERKEL who arrived in India on May 31 held wide-ranging discussions with the Indian leadership including the Prime Minister, Dr Manmohan Singh. The two countries reviewed the security scenario in Pakistan and Afghanistan and its implications in the region.

Angela Merkel asserted that terrorism had to be fought "on all fronts and not selectively". Dr Singh responded, "We discussed the developments in Pakistan and Afghanistan. Terrorism is a serious challenge which will have to be fought on all fronts and not selectively." After the talks, India and Germany signed four agreements for cooperation in vocational education, medical research, science and technology and nuclear physics. The Chancellor too is pitching for IAF's acquisition of 126 medium multi-role combat aircraft (MMRCA) in which Eurofighter Typhoon has been shortlisted, along with France's Dassault Rafale. **SP**

WHEN SOPHIE BLANCHARD CRASHED to her death while flying a balloon, a critic famously remarked, "A woman in a balloon is either out of her element or too high in it." That was 1809. Since then women have routinely shown that they can fly practically anything, balloons included. And Jeannette Piccard was in her element in a balloon, climbing higher than any other woman before had.

Born in Chicago on January 5, 1895, Jeannette Ridlon Piccard was an American teacher and scientist and a pioneer of balloon flight. She had a lifelong interest in science and religion. She was a worthy member of the renowned Piccard family of balloonists, not by birth but by marriage. She met Jean Piccard at the University of Chicago where he taught and from where she got her master's degree. They were among a handful of people with scientific knowledge of stratosphere problems. The 1920s and 1930s witnessed intense competition to reach the stratosphere by balloon. Auguste Piccard (Jean's twin brother) reached 51,783 feet and 53,152 feet in 1931 and 1932.

Before the advent of heavier-than-air flight, balloons (and later airships) were the main means of aviation. Ballooning was dangerous partly because hydrogen, then used as a lifting gas, is highly flammable, and partly because of human physiological limitations. As balloonists climb, they encounter two major hazards—oxygen deprivation and reduced atmospheric pressure. At 30,000 feet, loss of consciousness can occur in less than a minute without extra oxygen. Even with additional oxygen, ascending between 40,000 feet and 50,000 feet without a pressurised cabin (or at least a pressure suit) is to flirt with death. Due to reduced air pressure, the lungs cannot function and gases begin to bubble out of the blood. Many intrepid balloonists had close shaves and there were some tragic accidents.

Jeannette Piccard completed her first solo balloon flight on June 16, 1934. Later that year, the National Aeronautic Association of America certified her as the

country's first female licensed balloon pilot. The Piccard couple soon planned a flight to the stratosphere. Jean would concentrate on experiments and Jeannette would be the pilot. The "Century of Progress"—a balloon constructed for the World's Fair held in Chicago in 1933 to celebrate the city's centennial—was

and the *Chicago Daily News* sponsored the expedition. However, many people felt that a mother should not be taking such risks, and for this reason the National Geographic Society refused to back the flight.

However, all such reservations were forgotten on the morning of October 23, 1934. Around 45,000 spectators were at hand to witness the ascent from Ford Airport, Dearborn, Michigan. At 0651hrs, the couple and their pet turtle, Fleur de Lys, lifted off in the Century of Progress. They reached 57,579 ft (17,550 m) aloft, travelling eight hours, in a journey that took them over Lake Erie. Jeannette retained control of the balloon for the entire flight. They landed safely about 480 km away near Cadiz, Ohio, in a clump of trees. However, the balloon separated from the gondola and was ripped. With this feat, Jeannette became the first woman to successfully pilot a flight to the stratosphere. In the process, she set a new women's altitude record, and held it for 29 years. At one time National Aeronautics and Space Administration (NASA) even qualified the exploit as space travel and Jeannette was inducted in the International Space Hall of Fame. In fact, it took a spaceflight to break her record, when Valentina Tereshkova became the first woman in space in 1963. Nowadays, however, pilots are called astronauts only if they reach 80 km up into the mesosphere.

Jeannette later served as a NASA consultant from 1964 to 1970 and became a speaker for NASA. Her love for heights was not limited to the stratosphere, but extended to the spiritual dimension as well. In 1975, Dr Jeannette Piccard was ordained as the first female priest of the Episcopal Church. Her granddaughter later said, "She wanted to expand the idea of what a respectable lady could do." Once Jeannette was asked if she was afraid, and she replied, "Even if one were afraid to die, there is so much of interest in a stratosphere trip that one does not have time to be afraid. It is too absorbing, too interesting." She died of cancer on May 17, 1981. ^{SP}

—Group Captain (Retd)
Joseph Noronha, Goa



JEANNETTE PICCARD
(1895 - 1981)

She completed her first solo balloon flight on June 16, 1934. Later that year, the National Aeronautic Association of America certified her as the country's first female licensed balloon pilot. Jeannette later served as a NASA consultant from 1964 to 1970 and became a speaker for NASA.

their craft. It was the largest balloon in the world—105 feet wide and 6,00,000 cubic feet in volume. It took 700 hydrogen cylinders to fill. The gondola was designed by Auguste and Jean Piccard. The National Broadcasting Company

MILITARY

Asia-Pacific

First milestone of Kaveri engine flying test bed

Kaveri engine was integrated with IL-76 aircraft which is a well-established flying test bed (FTB) for engines at Gromov Flight Research Institute (GfRI), Russia. The flight trials commenced on November 3, 2010. Kaveri engine is one among the four engines on the FTB platform. Eleven flight tests for about 20 hours duration had been completed till April 2011.

Sikorsky delivers three VVIP S-92 to Royal Thai Air Force



Sikorsky Aircraft Corporation has delivered three VVIP S-92 helicopters to the Royal Thai Air Force, introducing the first high-end LifePort medical system into an S-92 aircraft. Sikorsky helicopters have been in use by Thailand military forces since 1996 including those being flown by the Royal Thai Navy, which flies Seahawk helicopters and S-76 helicopters. In addition, the Royal Thai Army flies UH-60L Black Hawk helicopters. The latest delivery of S-92 helicopters marks the first Sikorsky products for the Royal Thai Air Force.

Boeing delivers UAE Air Force and Air Defence's 1st C-17



On May 10, Boeing delivered the first of six C-17 Globemaster III airlifters to the United Arab Emirates (UAE) Air Force and Air Defence during a ceremony at the company's final assembly facility in Long Beach. The UAE

AIR MARSHAL N.A.K. BROWNE WILL BE NEXT CHIEF OF THE AIR STAFF

Vice Chief of Air Staff Air Marshal N.A.K. Browne will be the next Chief of the Air Staff on the retirement of Air Chief Marshal P.V. Naik on July 31, 2011. Born in Allahabad on December 15, 1951, Air Marshal Browne was commissioned into the Fighter stream of Indian Air Force on June 24, 1972. With about 3,100 hours of flying to his credit, he has had a varied operational experience that included flying Hunters, all variants of MiG-21s, Jaguars and Su-30s. An alumnus of the National Defence Academy, Khadakwasla, Pune, he is a Fighter Combat Leader, who served as an instructor at the Tactics and Air Combat Development Establishment and Defence Services Staff College, Wellington. A graduate of the Air Command and Staff College, Alabama, USA, he had undergone training with the Royal Air Force in the United Kingdom on Jaguar aircraft and went on to command a Jaguar squadron.



During his long and distinguished career spanning 38 years, he has held various operational and staff appointments that include Joint Director at Air War Strategy Cell at Air Headquarters, Chief Operations Officer and Air Officer Commanding of a Su-30 base, Assistant Chief of the Air Staff (Intelligence) and Deputy Chief of Air Staff (DCAS) at Air Headquarters, and Air Officer Commanding-in-Chief of the Delhi-based Western Air Command. •

will take delivery of three more C-17s this year and two in 2012 as it modernises its airlift capabilities.

India goes full steam to finalise \$10.4 billion jet deal

Despite some negative comments by those who were not shortlisted in the hotly-contested \$10.4 billion medium multi-role combat aircraft (MMRCA) race, India is going full speed ahead to finalise the deal by December this year. The aim is to ensure that deliveries of the 126 fighters begin from December 2014 onwards to stem IAF's fast-eroding combat edge. Only Eurofighter Typhoon (EADS) and French Rafale (Dassault) are now left in contention. The first 18 jets will come in "fly-away condition". Subsequent batches of the 108 fighters are to be manufactured in India by the Hindustan Aeronautics Limited (HAL) after transfer of technology. The first fighter built in HAL is likely to roll out in December 2016.

Americas

Honeywell Green Jet fuel powers Thunderbirds

UOP LLC, a Honeywell company, has announced that Honeywell Green Jet Fuel will power two Air Force F-16 aircraft as part of a Thunderbirds demonstration at Joint Base Andrews in Maryland. During a Joint Services Open House, two Thunderbird aircraft will perform using a 50/50 blend of Honeywell Green Jet Fuel made from camelina and petroleum-based jet fuel. Camelina, grown and harvested for the Air Force by Sustainable Oils LLC, is an inedible, second-generation plant source for biofuels that does not deplete valuable food, land or water resources.

Pratt & Whitney awarded contract

The US Department of Defense (DoD) has awarded Pratt & Whitney a \$1.13 billion contract for F135 production engines to power the F-35 Lightning II. Pratt &

QuickRoundUp

AEROVIRONMENT

• AeroVironment has announced that it has received a firm-fixed-price contract order valued at \$8.374 billion under a follow-on contract with the US Army. The order comprises new digital Raven small unmanned aircraft systems and initial spares packages. The Raven unmanned aircraft is a 4.2-pound, back packable, hand-launched sensor platform that provides day and night, real-time video imagery for "over the hill" and "around the corner" reconnaissance, surveillance and target acquisition.

AGUSTAWESTLAND

• AgustaWestland has announced that INAER, the leading European helicopter services provider, has signed contracts for two EMS-configured GrandNew light twin helicopters and four GrandNew light twin and one AW139 medium twin helicopters for offshore transport. INAER acts as an AgustaWestland Service Centre in several European countries including Spain, Italy, UK and France to offer onsite support services.

BAE SYSTEMS

• BAE Systems has been awarded long-term contracts worth a total of £39 million (about \$63.29 million) by the UK's Ministry of Defence to provide support services to ensure that Typhoon continues to maintain its ability to operate in all types of environments.

BOEING

• Boeing and Lufthansa Cargo have finalised an order for five Boeing 777 Freighters at a cost of \$1.35 billion, based on list prices. The airplanes will help Lufthansa Cargo in its initiative to modernise and expand its fleet. Lufthansa Cargo previously indicated its intention to order the freighters in March 2011.

DRDO INDIA

• India's Defence Research and Development Organisation has conducted a ballistic flight test of its Astra beyond-visual-range air-to-air missile (BVRAAM) at the Integrated Test Range at Chandipur. The Astra is a supersonic missile with a range of 80 km in its head-on mode and 20 km in tail-chase mode. The Astra can

APPOINTMENTS

EADS CASSIDIAN

Cassidian Spain has appointed Luis Hernández Vozmediano, a qualified aeronautical engineer, as the new Head of the Eurofighter programme. Luis Hernández has spent virtually his entire professional career at EADS.

SAFRAN

Safran has appointed Jean-Paul Herteman, as Chairman & Chief Executive Officer and Dominique-Jean Chertier, Ross McInnes and Marc Ventre, as Deputy Chief Executive Officers.

TEXTRON

Textron Systems has announced Don Hairston as Senior Vice President and General Manager, Advanced Systems.

BOEING

The Boeing Company and subsidiary Insitu Inc. have named Steve Morrow Insitu President and CEO.

Boeing has announced that its wholly owned subsidiary Tapestry Solutions has named R. Sam DeFord Jr. as President and CEO.



THE AIR OFFICER-IN-CHARGE MAINTENANCE, AIR MARSHAL J. NERI HANDING OVER THE SYMBOLIC KEY OF "RE-EQUIPPED" AN-32 RE AIRCRAFT TO GROUP CAPTAIN ALOK SHARMA ON JUNE 8

Whitney and the DoD have reached an agreement on price and terms for the LRIP 4 contract, originally awarded in July 2010, which contains fixed-price and cost-plus incentive fee elements. This low rate initial production (LRIP) contract includes production, spare parts, sustainment and delivery of the fourth lot of F135 engines.

Europe

Cassidian and Frequentis deliver CRC

The consortium "KOFA – GIADS" (Cassidian and Frequentis Nachrichtentechnik GmbH) has delivered an ultramodern control and

reporting centre (CRC) to the German Air Force, represented by the Federal Office for Information Management and Information Technology of the Bundeswehr (IT-AmtBw), in Erndtebrück. Cassidian is supplying the "battlefield command and control system" component, and Frequentis, the new IP-based voice and data communication system KOFA-IP. With this delivery, all German command posts of this Mission Command are now equipped with KOFA/GIADS-based technology.

Alenia Aeronautica delivers nEUROn

Alenia Aeronautica has recently delivered the Weapon

Bay Doors & Mechanism for nEUROn (the new-generation technology demonstrator for a European Unmanned Combat Aerial Vehicle-UCAV) to Dassault Aviation. This complex system was designed, built and integrated entirely by Alenia Aeronautica to include the weapon housing doors and the respective activation and control system.

Typhoon Century for UK



BAE Systems has celebrated the completion of the 100th Typhoon aircraft which was built in the UK's final assembly facility at Warton in Lancashire. Typhoon is one of the world's most advanced medium multi-role combat aircraft and it plays a vital role in sustaining key manufacturing skills in the United Kingdom. As part of the Eurofighter Typhoon consortium BAE Systems is responsible for the production of key aircraft parts including the front fuselage, fore planes, windscreen and canopy as well as carrying out the final assembly of all UK Typhoons. The design, development and manufacture of Typhoon sustain more than 1,00,000 jobs in 400 companies across Europe.

CIVIL AVIATION

Asia-Pacific

Dhruv helicopter simulator certified to Level D

The Helicopter Academy to Train by Simulation of Flying (HATSOFF) has announced that its simulator cockpit for the civil/conventional variant of the Dhruv has been certified to Level D, the highest qualification for flight simulators, by India's Directorate General of Civil Aviation (DGCA). The civil/conventional Dhruv simulator cockpit has been integrated with the CAE-built full-mission simulator currently in operation at HATSOFF. The

QuickRoundUp

travel 110 kilometres when launched from an altitude of 15 km, 44 km when fired from an altitude of eight kilometres, and 21 kilometres when launched at sea-level. The missile is to arm Indian fighters such as the Su-30MKI, MiG-29 and Tejas light combat aircraft.

ELBIT SYSTEMS

• Elbit Systems Ltd has announced that it has been awarded a contract valued at approximately \$18.6 million to upgrade the Romanian Air Forces' C-130 transport aircraft. According to the agreement, the C-130 aircraft will be installed with various types of advanced electronic systems, including those produced by Elbit Systems' wholly owned subsidiary—Elisra Electronic Systems Ltd.

GENERAL ATOMICS

• General Atomics Aeronautical Systems has been awarded a \$13.72 million contract for the purchase of 8 Linux processors, 41 improved display kits and associated spares for the ground control stations under the Predator/Reaper programme.

GENERAL DYNAMICS

• General Dynamics Armament and Technical Products, a business unit of General Dynamics, has celebrated 15 years of continuous employment at the company's facility near Camden with the delivery of its four-millionth Hydra 70 air-to-ground rocket. General Dynamics has been the sole manufacturer of the Hydra rocket for the US military since 1996.

HAWKER BEECHCRAFT

• Hawker Beechcraft has delivered a new batch of T-6C trainers to the Royal Moroccan Air Force (RMAF), bringing the total number of aircraft delivered to the North African nation to 12. The RMAF had ordered 24 aircraft in September 2009 to replace its fleets of Beech T-34s and Cessna T-37s. The manufacturer began deliveries in January 2011 with a first batch of four aircraft.

INDIAN AIR FORCE

• Three women members of the IAF officers mountaineering expedition have scaled the Mt Everest. Flight

SHOW CALENDAR

17-19 June
AEROEXPO UK
 Sywell Aerodrome, Sywell,
 Northampton, NN6 0BN, UK
www.expo.aero/uk

20-22 June
INDESEC EXPO 2011
 Pragati Maidan, New Delhi
www.indesec-expo.com

20-26 June
PARIS AIR SHOW 2011
 Paris Le Bourget Exhibition
 Centre, Le Bourget, Paris, France
www.paris-air-show.com/en

23-24 June
UNMANNED SYSTEMS ASIA 2011
 PARKROYAL on Beach Road,
 Singapore
www.unmannedsystemsasia.com

13-14 July
MILITARY AIRLIFT: RAPID REACTION AND TANKER OPERATIONS ASIA PACIFIC
 Grand Copthorne Waterfront Hotel, Singapore
www.smi-online.co.uk/events/overview.asp?is=1&ref=3638

14-17 July
EXPO AÉRO BRAZIL
 São José Dos Campos
 International Airport, São
 José Dos Campos, Brazil
www.expoaerobrasil.com.br

simulator features CAE's revolutionary roll-on/roll-off cockpit design, which enables cockpits representing various helicopter types to be used in the simulator. This is the world's first ever full mission simulator for the HAL-built Dhruv helicopter.

Americas

GE to power Bombardier Global 7000 and 8000
 GE Aviation's integrated propulsion system, which includes the engine, nacelle and thrust reverser, for the new Bombardier Global 7000 and Global 8000 business jets has been named Passport. The Passport engine for the Global 7000 and Global 8000 business jets will produce up to 16,500 pounds of thrust and incorporate advanced technologies.

INDUSTRY

Asia-Pacific

BEL Director gets EW Award
 I.V. Sarma, Director (R&D), Bharat Electronics Ltd (BEL), has been conferred with the Association of Old Crows (AOC)'s award for the "Best Contributor in Electronic Warfare (EW) from Indian PSUs". Sarma received the award during a function organised by AOC's India chapter in Bangalore on May 7, 2011. Sarma was conferred with the award for contribution to the development, manufacture, qualification and induction of EW systems.

Americas

Bombardier Aerospace releases market forecasts
 Bombardier Aerospace has released its annual aircraft market forecasts for the business aircraft markets. While both business and commercial aircraft were affected by the recession, business aircraft industry indicators are trending upwards. China, India and other developing regions are leading the global industry recovery and are expected to capture an increasingly important share of industry orders in both the business and commercial aircraft markets. For the 20-year period from 2011 to 2030, the Bombardier forecast predicts a return to sustained growth in business aviation, with business jet manufacturers delivering a total of 24,000 business jets in all segments in which Bombardier competes, representing total revenues of approximately \$626 billion.

Europe

Airbus eGenius takes to the sky
 Six weeks after its first public presentation at the international Aero-Expo in Friedrichshafen, Germany, the Airbus sponsored technology demonstrator "eGenius" performed its maiden flight on May 25 from the airfield in Mindelheim, Bavaria, Germany. During the 20 minutes flight, the main focus was on checking the handling qualities and

proving the unique propulsion system in flight. The "eGenius" features an electric propulsion system which pushes the limits of electric flight to a power level of 60kW. In the following flight test campaign the flight envelope will be enlarged continuously by verifying the flight performance and reliability of the electric propulsion.

Cassidian and Alcatel-Lucent join hands

Cassidian and Alcatel-Lucent have announced a joint development agreement under which the two companies would provide an innovative mobile broadband solution for emergency response and security communications systems operating in the 400 MHz spectrum band. Using LTE technology, the joint Alcatel-Lucent and Cassidian offering will support broadband data services such as mobile video security, location based video services and smart vehicle integration of devices and applications to complement the current voice and data systems.

SPACE

Americas

Mars Science Laboratory Aeroshell delivered



NASA's Mars Science Laboratory (MSL) aeroshell and cruise stage were delivered to Kennedy Space Center, Florida on May 13. Lockheed Martin built the A and NASA's Jet Propulsion Laboratory built the cruise stage. The aeroshell will encapsulate and protect the curiosity rover during its deep space cruise to Mars, and from the intense heat and friction that will be generated as the system descends through the Martian atmosphere. Recently, Lockheed Martin integrated the MSL Entry Descent and Landing Instrument (MEDLI) onto the back of the heat shield. •

QuickRoundUp

Lieutenant Nevidita Choudhary scaled the Everest on May 21, followed by Squadron Leader Nirupama Pandey and Flight Lieutenant Rajika Sharma who reached the summit on May 25.

L-3 COMMUNICATION

- L-3 Communications has announced that its Systems Field Support Division has been awarded contracts with a total potential value of more than \$300 million over five years from the US Navy and US Air Force to provide full Contractor Logistics Support for their respective fleets of C-12 aircraft.

LOCKHEED MARTIN

- The first Lockheed Martin-built Space Based Infrared System (SBIRS) geosynchronous (GEO-1) spacecraft has successfully reached its intended orbit and is performing as required following its successful launch from Cape Canaveral Air Force Station. SBIRS GEO-1 is the most technologically advanced military infrared satellite ever developed and will enhance early warning of missile launches around the globe, support the nation's ballistic missile defence system, greatly expand technical intelligence gathering capability, and bolster situational awareness for war-fighters on the battlefield.

NORTHROP GRUMMAN

- Northrop Grumman Space and Mission Systems has been awarded a \$427.9 million contract modification for design and development, including the incorporation of Department of Defense mission assurance and compliance requirements, to modify the National Polar Orbiting Operational Environmental Satellite System baseline to establish the Defense Weather Satellite System baseline.

RAYTHEON

- Raytheon Company has received an \$84.7 million US Navy contract for continued production of ALR-67(V) 3 digital radar warning receivers. The ALR-67(V) 3 is the US Navy standard for digital radar warning receiver technology and is installed on all frontline, carrier-based F/A-18 E/F tactical aircraft.

NEED *of the* HOUR

OPERATION NEPTUNE'S SPEAR UNDERTAKEN in Pakistan recently by the US Special Forces was reminiscent of the American movies featuring the swashbuckling Navy SEALs, US Marines, Central Intelligence Agency, etc—unravelling similar plots. The question that arose in the public mind immediately after this real-life adventure to nab Osama bin Laden, the most wanted terrorist in the world was—does India have the capability to undertake similar operations across enemy lines? Given the prevailing security scenario in the region and a distinct possibility for such an option, this question was pretty much expected. While every citizen of India has the right to be informed of the military capability of our armed forces and their state of preparedness, they 'need not' know the 'task-specific' and 'role-specific' capabilities of special operations. More importantly, our adversaries must 'never know'. Special operations require detailed planning, training and coordination amongst the various military and civilian agencies. Silence therefore is the key to a reasonable degree of success. Given the complexities of special operations, it would be prudent for those not connected with the planning and execution of missions to remain totally detached. Is it therefore even necessary to discuss our special operations capabilities in the public domain? In fact, even those in the armed forces and related civilian agencies not 'directly' involved in the planning and conduct of these operations are unaware of the actual capabilities, tactics, skill sets and weapon profiles of Special Forces. Lower the exposure of Special Forces, greater the probability of success of missions.

There are, however, a number of misconceptions about the very necessity, purpose and composition of Special Forces. It is a common belief that these operations are always heliborne whereas these could be airborne, shipborne, sub-surface or land launched missions, with a desired force and weapon mix related to tasks in hand. Any operation which does not conform to conventional military norms during war and peace falls under the category of special military operations and these could be either covert or overt, depending on the situation. The most important ingredient for success in these operations, besides of course the combat capability of task force, is actionable real-time intelligence, both human and technical. This is a long, patient and arduous process which can take days, weeks or months to prepare, collate information and plan to determine the right window of opportunity to launch a special operations mission to achieve a specific task or aim of national importance. These operations are not premised on military tenets of responses to conflict situations alone, but are national tasks cleared and approved at the highest levels of government and military leadership. A country could make a grave mistake if a mission of this nature is launched without factoring in the



A comprehensive and integrated approach involving the military, civilian establishments and the government to develop and maintain potent capability for special operations is the need of the hour, **irrespective** of whether the capability is used or not

many issues of strategic importance—the prevailing geopolitical situation, military preparedness of the adversary, escalation dynamics, own preparedness, terrain, etc. It must be understood that it can never be a knee-jerk counter-response to a particular situation demanded by angry nationalists, media activism or compulsions of domestic politics.

It is however axiomatic that armed forces all over the civilised world prepare only for capabilities and not intentions, because intentions of likely adversaries always remain inscrutable. Therefore, always built into these capabilities are the force levels, equipment, training, expertise, concepts and tactics for the conduct and execution of special military operations—both covert and overt. The Indian armed forces are no different, and are adequately equipped, trained and motivated for this role. It is the omni-present dilemma of inscrutability of the likely adversary (state or non-state) in our neighbourhood, that makes it mandatory for our armed forces to remain ever prepared, and hone their skills continuously in the special operations domain. Future conflicts, militancy and terrorism will assume many forms and may not fit neatly into convenient categories and classifications—the actors will be diffused and faceless and the terrain will vary from the urban to the remotest mountain peaks. We need to be equipped, trained and prepared to acquire, target and neutralise these threats clandestinely, from the air, on the ground and from the seas as and when the need arises. While I dare say that our armed forces have the special military operations capability to address all these situations and more, they will be seriously handicapped in undertaking these missions in the absence of actionable, real-time human and technical intelligence. This has to improve for achieving the desired aim, impact and surprise in special operations mission.

A comprehensive and integrated approach involving the military, civilian establishments and the government to develop and maintain potent capability for special operations is the need of the hour, irrespective of whether the capability is used or not. **SP**

— Air Chief Marshal (Retd) F.H. Major

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