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[inside]

RAFALE: GOING STRONG



HAL'S LIGHT COMBAT HELICOPTER

04 India:
Rotorcraft Central



08 Interview:
Pranav Nagpal, OIS-AT



12 Interview: Air Mshl (Retd)
Arvind Walia, Sikorsky



22 Interview:
John Gay, Rolls-Royce



FLYING HIGH: RAFALE NEARING FINALISATION OF THE CONTRACT

BY R. CHANDRAKANTH

On a warm sunny morning, the ninth edition of Aero India 2013 kick-started with a promise of enormous potential in the fast growing aerospace and defence sector. Both the Defence Minister A.K. Antony and the Civil Aviation Minister, Ajit Singh set the tone for accelerated growth of the two sectors.

Inaugurating Aero India 2013, Antony said the event had reached its outreach in terms of participation and infrastructure and participation by domestic companies had increased exponentially. As the fastest growing aerospace and defence market, India had the potential to meet national requirements both with regard to military and civil.

The roadmap for creating an aerospace and defence industrial base was evolving and the government was keen on the private sector becoming active partners. As India was emerging as an attractive market and key outsourcing hub, the need to strike new alliances both within and outside the country was urgent.

Talking about enhanced participation by Indian establishments, Antony urged Defence Research and Development Organisation (DRDO) to remain committed to the country's urgent requirements and said it should look at such developments with or without international partners.

SKY IS HOME

The Civil Aviation Minister Ajit Singh seized the oppor-



DEFENCE MINISTER INAUGURATING AERO INDIA 2013

tunity to explain the humongous potential that the civil aviation sector was opening up in India. The sector was the fastest growing market having a passenger growth of 15 per cent compounded annual growth rate. The domestic air traffic was at 180 million passengers per annum and 80 million international passengers per annum. By 2020, India will be among the top three aviation markets and as per the International Air Transport Association (IATA), India will be among the top five by 2016, registering the second highest growth rate.

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Defence Minister Apologises for Budget Cuts; But Says Aero India Growing

"Rome was not built in a day," said Defence Minister A.K. Antony expressing satisfaction at the increasing presence of Indian companies at this year's air show at Yelahanka, while he expressed his regrets for cut in the defence budget. "There has been a two third enhancement of area. While the 2011 air show was spread in an area of 75,00 sqm, this year's show is spread over an area of 1,25,000 sqm and we are finding it difficult to accommodate the increasing number of Indian and global companies looking for space. The number of aircraft coming to the show is also increasing. Over the years the show is enhancing. Further, in the last two years, both private and public sector has made major breakthroughs."

The Defence Minister apologised for the budget cut, but said that it's not exclusive to the Defence Ministry and all departments have been asked to fringe their budgets. "It is not purposeful. Global recession has affected us all and we have to tighten in certain areas for a better future. Budget on priority areas is however not reduced. There is no expenditure cut with regard to operational cuts. We are all aware of the geo-political situation around us and the emerging threats, national security is important for us and the role of armed forces is crucial. Acquisition is necessary for operation. We will do everything possible for operational preparedness. Government is taking steps to face any eventuality that comes against national security. We are taking sufficient steps to safeguard our security. Our armed forces are also confident

of meeting any challenges and we will equip them adequately."

On questions with regard to the budget cuts affecting the medium multi-role combat aircraft (MMRCA) programme, the Defence Minister said that it is just a speculation. MMRCA he said is the biggest of all procurements. "It is in the contract negotiation stage now and will go through another six-seven stages. We cannot cut short the procedures. It is not delayed. There will be no compromise on transparency. We are following the terms and conditions of the request for proposal (RFP)."

Answering a query on the intermediate jet trainer (IJT), he said that the Hindustan Aeronautics Limited (HAL) is trying to speed up the programme. Year 2015 onwards they will be able to produce. The IAF has got the Hawks, the Pilatus trainer aircraft and now it's the IJT. With full cooperation of the Defence Research and Development Organisation (DRDO), HAL will be able to make a major breakthrough soon. Similarly, on the deal to procure 197 light utility helicopter, the Minister said that it will be going to the Defence Official Committee. "All Service Chiefs, the Defence Secretary, the Defence Production Secretary, Defence Acquisition Secretary, Indian Coast Guard all together will take the decision." Antony also said that it is the Cabinet which would take the decision on the Naresh Chandra Committee recommendations.

The Chinese are attending the Aero India for the first time and the Defence Minister welcomed them. "Despite the problems, both the countries are trying to sincerely develop good relationship (cultural, social) and we have signed a border management agreement too," said Antony. •

—SUCHETA DAS MOHAPATRA

in airlines, he was hopeful that there would be infusion of investments as well as top management expertise in the sector.

IMMENSE CHALLENGES

Singh said along with these opportunities, there were immense challenges, particularly in creating infrastructure. The pace had been stepped up. Mentioning that modernisation of 35 non-metro airports and setting up 15 Greenfield airports under public-private partnership model were in different stages, Singh said this would open up economic activity in different regions. To enhance air connectivity, low cost airlines and regional airliners were been developed.

GAGAN OPERATIONAL IN JULY THIS YEAR

Speaking about GAGAN (GPS-aided Geo-augmented Navigation System), Singh announced that it would become operational in July this year. The GAGAN footprint would extend to the Asia-Pacific region. About 14 automatic dependent surveillance – broadcast (ADS-B) stations were coming up to provide seamless surveillance coverage.

The Karnataka Chief Minister Jagadish Shivappa Shettar announced an exclusive Karnataka aerospace policy which was released by the Defence Minister. Karnataka had set aside 1,000 acres of land for an aerospace park near

the Bengaluru International Airport and companies such as HAL, Dynamic Technologies, Jupiter, etc had confirmed setting up plants here.

The city had developed into a major aviation hub and he recalled some of the pioneers in the aviation field who were from Karnataka including aviator Venkat Subbaih Shetty, besides HAL beginning its national footprint from here. He announced that regional Greenfield airports such as Gulbarga and Shimoga airports would commence soon.

EXPANDING INDUSTRIAL BASE

In his welcome address, the Secretary, Defence Production, Radhakrishna Mathur said from a modest beginning in 1996, Aero India had emerged as a global event. The defence production and procurement policies, he said, were oriented towards creating self-reliance and the government was working towards creating an eco-system for private enterprises, particularly small and medium enterprises. The emphasis was on expanding the industrial base as India had the wherewithal – large technical talent pool and emerging facilities.

The President of FICCI, Naina Lal Kidwai, said Bengaluru had the potential to replicate the success of the information technology sector. The aerospace and defence sector could generate huge employment opportunities and propel India to a higher level. •

Defence Partnership is the Greatest Success Story: US Ambassador

The US Ambassador to India, Nancy Powell who inaugurated the US pavilion, the largest after India, reiterated that Indo-US ties, particularly with regard to defence was strong. "Our growing defence partnership is one of our greatest success stories, leveraging the best innovative efforts of our governments, people, and industries into closer cooperation on regional and global security challenges, as well as the economic achievement for the people of both our countries."

The Ambassador said, "Our defence relationship has continued at a strong pace. C-17, C-130J and P8I procurements are now being executed. In fact, the Indian Air Force recently received its first Boeing C-17 strategic airlifter for flight testing."

The collaboration between our two countries in the defence marketplace is evident here today. The US companies participating at this show have demonstrated a commitment to partner with India on its goal of modernising and upgrading its defence aerospace capabilities, she added.

"This is just one indication of how the US Government and our mission in India stand beside you as you embrace the opportunities and tackle the challenges in the Indian defence sector." •

UK Keen on Two-way Defence Equipment Trade: UK Minister

The UK Minister for Defence Equipment Support and Technology, Philip Dunne who is heading a delegation of nearly 40 UK companies at the show is keen that Indian companies participate in UK's defence equipment procurement as UK companies would be trying to sell their wares in India. "We are looking for companies from across the world to participate in UK's defence procurement and all they have to meet is the quality requirements."

Disappointed that Eurofighter Typhoon lost out on the MMRCA deal, the Minister was hopeful that there were many other programmes that the two countries could collaborate on and mentioned the tie-ups between Rolls Royce and HAL and that of Tata Advanced Materials with Strongfield Industries. "We are actively campaigning in other countries," he said and cited the recent order which Oman has placed for 12 Eurofighter Typhoons.

The present UK Government, unlike the previous one, he said, was laying great emphasis on defence exports. In 2011, defence exports had risen marginally to 5.4 billion and in 2012 it would increase, taking into consideration the Oman order.

He said there would be growing UK participation in many of India's defence programmes which will include transfer of technology, joint ventures, collaborations, etc. There was tie-ups between DRDO and UK's Defence Science and Technology Laboratory (DSTL) in chemical and biological equipment; protective clothing, etc. •

—R. CHANDRAKANTH

India: Rotorcraft Central

BY SP'S SPECIAL CORRESPONDENT

In case you didn't notice, Aero India 2013 isn't really a fighter show. Then again, all comparisons with the 2011 show are unfair considering that the MMRCA competition is no longer technically, a competition. Move over fighters. Enter helicopters. All things considered, India happens to be the largest potential buyer of helicopters in the world – across its three military arms and the paramilitary forces. There is no security service in the country – including several state police services – that don't have a stated intention to induct helicopters. The Indian Navy, Indian Air Force and Indian Army all need helicopters. Desperately, and across the board.

The deal conspicuous by its lack of apparent movement towards a decision is the reconnaissance and surveillance helicopter (RSH) bid that squares the Eurocopter AS550 C3 Fennec against Russia's Kamov Ka-226T Sergei to give the Indian Army and IAF light helicopters for high altitude logistical and other operations. And the questionmark that hangs over the deal is writ large here at Aero India. From an RFP release in 2008 and field evaluation trials that were completed in January 2011, the competition remains in limbo, with nary a decision nor any indication of when the MoD may decide. Both Rosoboronexport, which governs Kamov, and EADS subsidiary Eurocopter were recently asked to extend the validity of their commercial bids for the fourth time. There is exasperation and anxiety in both camps. Eurocopter is particularly nervous considering it has had a near win be turned into a defeat with a shock re-tender in December 2007. The stakes are high too. While the deal itself may hover at under a billion dollars in value, it involves a full purchase from the OEM's production line without the rigour of technology transfer and is for the decidedly high order of 197 helicopters -- the largest single order of either type ever if it comes through.

The other substantial contract that remains undecided is the Indian Navy's multi-role helicopter (MRH) programme for 16 helicopters, in which bids are all set to be opened at any time. The NHIndustries NH90 competes with the Sikorsky S-70B Sea Hawk for a deal that could be potentially worth \$1 billion. In this particular competition, field evaluation trials were completed in late 2011. The competition has been far from smooth, with accusatory letters flying thick and fast to the MoD calling for a pause in proceedings over allegations of lack of fair play. The MRH competition looks to augment and replace the Indian Navy's fleet of ageing Westland Seakings. The Indian Navy also happens to be in the process of evaluating upgrade bids for the old Seaking fleet of shipborne multi-role helicopters -- the Navy is currently evaluating packages offered by AgustaWestland and Israel's IAI.

Just in case Indian contracting wasn't protracted enough, the MRH programme will be swiftly followed by what the Navy calls the NMRH, an entirely separate tender for 44 helicopters. In this, the Lockheed Martin's MH-60R, which dropped out of the MRH competition, will take part.

The Indian Navy is clearly where all the action is as far as rotorcraft are concerned. In August last year, it announced interest in acquiring 56 new generation utility helicopters for a competition christened naval utility helicopter (NUH). According to documents, the navy says it is interested in a twin-engine helicopter that is adverse weather day and night capable for missions across the spectrum of operations that will encompass SAR, CASEVAC,

logistics, communication duties, observation and surveillance, basic ELINT gathering, anti-submarine attack with a light torpedo or depth charge, dynamic response during aid to civil authorities and anti terrorism or piracy. The Indian Coast Guard, which recently celebrated its 36th anniversary, is also looking for utility helicopters for similar roles. Eurocopter, which fielded the Fennec at Aero India 2011, has chosen instead to put on display the navalised AS 565 Panther, a platform on offer to the Indian Navy and Indian Coast Guard. Other contenders are expected to include Russian Helicopter, Sikorsky and AgustaWestland.

With the HAL-IAI Chetak-based NRUAV delayed and unproven, the Indian Navy is also to make a decision on a shipborne unmanned rotorcraft for surveillance and target acquisition. Northrop Grumman, Saab and others remain contenders and await guidance in how the Navy plans to play.

Aero India 2013 comes shortly after big ticket decisions in the Indian rotorcraft space. In October last year, Boeing CH-47F Chinook was declared lowest bidder in the IAF's heavy-lift helicopter tender for 15 units. It defeated the formidable Russian Mi-26T2 helicopter. Shortly before that, Boeing AH-64D Apache Block III beat the Russian Mi-28NE Night Hunter for the IAF's attack helicopter requirement. The twin victories have put Boeing Defense on a sweet wicket ahead of the big show – the company now has the largest in value terms of Indian defence business of any American vendor, and there's potentially more in the pipeline. Aero India 2013 will see a highly welcome milestone with the handing over of the first indigenously developed ALH Rudra armed helicopter to the Indian Army. The Mk.4 version of the ALH Dhruv – a flagship of HAL – will be a formidable addition to the Army Aviation Corps arsenal. The platform paves the way also for the promising light combat helicopter that will shortly be joined in flight test by a third prototype that promises to be a far lighter, more capable machine than the two vehicles flying currently.

Several other opportunities remain hanging in the balance. HAL's light utility helicopter – a mock-up of which will be visible once again this year – needs an engine and systems, and there's already a competition on between LHTEC (a joint venture of Rolls-Royce and Honeywell) and Turbomeca. And finally, though a little more remote in the current circumstances, is the Indian Multi-role Helicopter (IMRH), HAL indigenous proposition that remains on the drawing board for want of a technology partner. This, like other opportunities, remains wide open. •



ALH RUDRA ARMED HELICOPTER

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The IAF's 'Generation' Dream

BY SP'S SPECIAL CORRESPONDENT

Four years ago, in February 2009, the world got its first glimpse of India's secretive next-generation fighter aircraft effort. Typically christened with the anodyne 'Advanced Medium Combat Aircraft' (AMCA) working title, crowds at Aero India 2009 puzzled at the shiny wind-tunnel model. Four years later, the programme has shaped up in more ways than one. For starters, its design has been refined considerably – a new model representing the aircraft's refined shape is on display at this year's show – and the project itself is quietly gathering steam. After all, models and artwork mean little for a fighter programme that is undoubtedly India's most ambitious. In 2009, when the AMCA model – then just called the MCA – the then Defence Research and Development Organisation (DRDO) chief M. Natarajan had said the aircraft would be an advanced fourth-generation platform, and not a fifth-generation one. Since then, the Aeronautical Development Establishment's (ADE) sights have been set considerably higher, and the AMCA, as we know it today, is definitely intended to be a fifth-generation platform. Some would say they're aiming at the stars, as DRDO agencies are typically wont to do. But there is a special recognition this time that the Indian Air Force (IAF) will accept nothing less than a cutting-edge stealth fighter.



But there remain several questions: Why is India spending valuable resources on the AMCA when it is already spending billions on the Perspective Multi-role Fighter (PMF) the modified Indian variant of the Russian Sukhoi T-50 PAK FA fifth-generation fighter aircraft that is already in flight test mode? Isn't there an unnecessary duplication of effort? Why is there still a question over whether India is interested in the Lockheed Martin F-35 Lightning-II? With budget cuts and austerity measures, can India afford to fund two expensive fifth-generation fighter programmes? Are India's next-generation requirements clearly defined? Will the PMF/FGFA and AMCA occupy similar spaces? How will their roles be separately defined? Is the FGFA truly a "joint" effort, or is it more on the lines of the Su-30MKI programme? These and many other questions remain without satisfactory answers at this stage. But one thing remains perfectly clear: while the T-50/FGFA is already in flight test (though it won't be in service before the end of the decade or thereafter), the AMCA is still very much on the drawing board, which perhaps means the aircraft is unlikely to be a reality until well into the next decade. Incidentally, visitors to Aero India 2013 will be treated to models of both the refined AMCA as well as the "modified" HAL version of the PMF/FGFA.

While the PMF/FGFA programme is projected as a joint effort, there should be no real illusions about just how "joint" it is. The Indian PMF will be a Russian platform with a handful of important Indian or Indian-selected/customised systems – much like the Su-30MKI. Therefore, the benefits that accrue to the Indian aerospace establishment in terms of fighter development are not quite solid.

And there is, perhaps, where the AMCA comes in. Built from the ground up by Indian scientists in Indian laboratories, the AMCA will be a fully Indian effort. And like the LCA, will be representative of India building its own platform as a result of circumstances. No country in the world will share stealth technologies. That's the reality. As it stands, AMCA is a stealthy fifth-generation manned fighter concept intended to produce a potent multi-role platform (with a focus on strike profiles) that will, in time, augment and replace the Indian Air Force's Jaguars and MiG-27s. The government used to prefer that the AMCA project, headed by scientist Dr A.K. Ghosh, remain below the proverbial radar, but no longer. The government is finally prepared to talk about the project and openly fund it. The secrecy with which the effort progresses have led many to wonder if the AMCA could actually be India's final indigenous manned fighter aircraft programme. (The question assumes huge importance considering that full scale engineering development (FSED) of the platform could begin within a year.) That notion is supported by two facts: one, the aeronautical establishment will be investing majorly in unmanned combat aerial vehicles (specifically the Predator-like Rustom-H and stealthy flying wing IUSAV) going with doctrine, and two, the fighter types that will be inducted in the next decade – both Indian and foreign – will be templates for improved variants that could be in use for at least the next half-century.

For now, however, the AMCA is a well-defined programme that looks to deliver tangible results in terms of a credible, potent combat aircraft platform on the lines of the Lockheed Martin F-35 Lightning-II. It makes sense, therefore, for the Indian military-industrial complex to develop evolutionary technologies that will find place both on manned and unmanned platforms. On the AMCA, Indian scientists are looking to push the envelope further than they have ever tried to before. Every little bit makes a difference when a legacy leap is at play, which is why, from engine performance parameters to control surfaces to control laws to cockpit ergonomics, everything is up for change.

The obvious evolutions are clear: low-observable shape and airframe materi-

als, extensive use of carbon composites, internal weapons bays, low bypass low-emission engines, modular internals, etc. The deeper you go, the more complicated and revolutionary the plans actually become.

If AMCA Project Director Dr Ghosh meets his objectives, then one of the most compelling aspects of the AMCA will be its cockpit and man-machine interface. To begin with, unlike the decidedly crowded, fourth-generation cockpit of the LCA Tejas, the AMCA cockpit is being developed with a panoramic active-matrix display, of the kind available on American fifth-generation aircraft. Switches, bezels and keypads stand to be replaced with touch screen interfaces and voice commands. What Dr Ghosh's team wants is for the future IAF pilot to have a helmet-mounted display system that allows the dispensing of a head-up display (HUD) from the cockpit altogether, a revolutionary concept. The Aeronautical Development Establishment (ADA), which oversees the AMCA programme, has asked private industry in the country to explore the feasibility of creating primary panoramic displays and other avionics displays that would befit a fifth-generation cockpit environment. The cockpit, however, is simply one of what is a hugely ambitious technology wishlist that Dr Ghosh and his team are pinning their hopes on for the aircraft they ultimately produce.

The proposed evolutions begin at the lowest level – system architecture – and will attempt to build a triplex fly-by-light electro-optic architecture with fibre-optic links for signal and data communications, unlike the electrical links on the Tejas platform. Significantly, unlike centralised architecture on the Tejas, the AMCA proposes to sport a distributed architecture with smart sub-systems. Likewise, unlike the LCA's centralised digital flight control computer (DFCC), the AMCA is likely to have a distributed system with smart remote units for data communication with sensors and actuators, a system that will almost definitely require much faster on-board processors.

Sensors will be a proving ground for just how advanced the AMCA programme is, and will be in reality a test case for future applications on unmanned vehicles. Scientists will be working towards getting the mechanical gyros and accelerometers, standard on the Tejas, to evolve on the AMCA into fibre-optic gyros, ring laser gyros and MEMS gyros. The pressure probes and vanes that make up the air-data sensors will become an optical and flush air data system, and position sensors will be linear/rotary optical encoders. Importantly, actuators – currently electro-hydraulic/direct drive – could be electro-hydrostatic to accrue substantive weight savings on the AMCA. Sensor fusion for an overarching situation picture is something the ADA is already attempting to achieve on the Tejas suite, so one the AMCA it should be a standard requirement.

One of the key areas that India has lagged behind on is control laws. The AMCA should feature highly evolved integrated control laws for flight, propulsion, braking, nose wheel steer and fuel management and adaptive neural networks for fault detection, identification and control law reconfiguration. All of this will cost the country much, but will find valuable applications in the unmanned programmes, particularly AURA. Unlike the Tejas, which features an avionics systems architecture based on functionality-based individual computer systems connected on MIL-STD-1553B buses and RS 422 links, the AMCA's avionics systems architecture, it is hoped, will feature a "central computational system connected internally and externally on an optic fibre channel by means of multiport connectivity switching modules". In such a system, functionality will be mapped on resources optimally and reallocated when faults occur. Data communications on the AMCA's processing modules will be through a high-speed fibre channel bus, IEEE-1394B-STD. The connectivities will be switched by means of a multiport switching matrix, with data speeds of 400 MB/second. In literature made available on the programme, these facets reveal the stunning leap scientists are looking to make with this one manned aircraft programme.

The AMCA is almost certain to have integrated radio navigation systems, where all burdens earlier borne by analogue circuits will be carried out by digital processors. Communication systems will be based on software radio ranging from UHF to K band, with data links for digital data/voice data and video. One of the most exciting new area being exploited for the AMCA is algorithms. While the LCA suite no major decision aid to the pilot, the AMCA commander will have the ability to plan attack strategies, avoidance tactics, retreat strategies and evasive strategies for himself and his partners in the air. Each of these technologies, planned in a manned environment are being evolved and developed for extension to an autonomous unmanned environment as well. Critics would argue that the establishment needs to focus on finishing what it has started before dreaming big. Others would say, it's better to think big now, than face repeated obsolescence even before your bird flies.

But these are early days, months and years yet. There is a mountain of work to be done, with little time and even less money. The only way, hopefully, is up. •



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Security Risks to High Value Assets and Emerging Security Concepts



■ Pranav Nagpal, Vice President, Business Development, OIS-AT

SP's ShowNews (SP's): Can you offer your comments on the future of aviation sector with respect to offset policy procurement?

Pranav Nagpal (Nagpal): In India, investment requirement for airport development is projected at more than ₹30,000 crore with approximately 70 per cent of the investment expected from the private sector. Also, the Indian Government has liberalised foreign direct investment (FDI) policy in the aviation sector permitting foreign airlines to buy 49 per cent stake in Indian carriers to give a boost to civil aviation. With measures like Bengaluru Special Economic Zone and formulation of the offset policy, Indian aerospace and the aviation sector is likely to grow rapidly. With defence offsets opening up investment in civil aviation and internal security sectors as well, this provides an unprecedented incentive to make Indian airport infrastructure on par with the best in the world.

SP's: What security risks are envisaged for high value assets like airports?

Nagpal: Airport operations, both passenger and cargo, require the highest level of security beyond perimeter walls. Following 9/11, many international airports have initiated measures to improve security and safety systems, whilst being under pressure from competition to improve the passenger experience as well. Since this is a concentrated area for threatening elements to potentially gain entry or exit from an area, there is a need for increased policing, monitoring, tracking and identifying of such persons. Given the sheer numbers and value of people and assets transitioning at mid-large airports itself warrants an increased level of security at these points.

SP's: What are the emerging trends in technologies for protection of high value assets?

Nagpal: In our experience whilst dealing with airport authorities, owners and security agencies, the biggest flashpoint emerges in the contrary objectives of increased security and passenger comfort. Whilst security levels sometimes justifiably warrant extreme levels of intrusive checks and delays, both inside and outside an airport, the ground realities of providing passenger comfort at an international level is also seen as necessary to maintain a competitive edge internationally. Maintaining a fine balance has become a critical factor in the success of a security system these days.

Today's technology combines non-intrusive but very effective tracking, classification, identification, detection and alarm flows. Security systems today are integrated, smart and powerful, yet discreet. They effectively manage the huge number of activities that could potentially cause alarms, to only select outlier behaviour that warrants a response by security personnel. A modern security system would depend on integrated management system capable of integrating a diverse range of required technologies like infrared detectors, lasers, radars, buried cable vibration sensors, thermal detectors, video cameras, analytics, access control, baggage scanners, cargo scanners, etc.

SP's: Could you please elaborate on the new sorts of sensors available in the market or through your firm for airport security?

Nagpal: There are a number of technologies that have been developed to address security concerns worldwide, and one of my responsibilities is to identify technologies globally that could be suitable for the Indian environment, with a view to ultimately providing a more robust technology to a security agency or an airport in India. For example, through our tie-ups we are bringing to the market advanced vibration detectors and infrared barriers that run autonomously with no need for power supply. This is critical in security installations where power supply becomes a concern yet there is a requirement for a state-of-the-art security system. Both technologies filter out normal behaviour or environmental false alarms and give a very precise alarm when there is a real intrusion. We also have lasers that are used in European airports that can detect any movement over land as well as water, this is particularly useful for airports that face threats from waterways or the sea close by. We are for the first time bringing to India a wide area surveillance radar that is used extensively in airports worldwide. This radar allows normal movement in or around an airport, offers superior classification,

track and trace capabilities, and generates a visual confirmation of a detected intrusion/perimeter breach. This radar controls a PTZ camera to give constant visual information to the security staff with no interaction necessary. We are also deploying discreet and hidden vibration detectors that are buried underground that form safe zones in or around airports. Unlike traditional microwave technology, these cables work on laser beams being pulsed through standard fibre-optical cables and are thus much more robust and cheap. Every security installation invariably needs a level of CCTV and analytics, but we are promoting a level of intelligence in analytics that is on par with Hollywood science fiction. This system starts learning about its environment when you switch it on and thereafter only alarms on behaviours that it hasn't seen before. Its algorithms are made almost akin to how a human starts learning about the world around it.

SP's: What is the future of IT systems with respect to security for high value assets?

Nagpal: For perimeter security and runway/taxiway surveillance, technologies can be selected based on threat perception, terrain and local weather conditions. Public and passenger access ways, passenger terminal access areas, staff/supplier access ways and luggage and air freight flow are equally important since they offer an opportunity to undesirable elements to gain entry and create problems. All these technologies would be integrated using an IT network backbone and Security Management System (software) connecting various technologies and devices to servers. The command and control centre would comprise of displays controlled by user-friendly Graphical User Interface. The integrated Security Management System should offer ease of use, clear and concise graphics, clear menu boxes and dynamic control panels. The main thrust of modern security software is the intelligent way in which they generate, classify and present an alarm to a user. Most good systems would go beyond just showing an alarm with a video verification, and also present the user with a workflow on what steps need to be taken for each type of alarm. These could include mitigating actions, physical verification, escalation and communication. The best systems integrate all sorts of data integration including communications, mapping and dealing with national or local threat levels to modify security procedures accordingly.

SP's: What are the information security and continuity measures in case the IT infrastructure becomes dysfunctional due to poor third party software or cyber attacks?

Nagpal: These systems are envisaged to protect high value vital installations hence all information security aspects need to be addressed. We have to take care of three basic Information Security Attributes, i.e. Confidentiality, Integrity and Availability. Confidentiality of information is to be ensured by state-of-the-art encryption techniques. Integrity means that data cannot be modified undetectably and always remains authentic. Some measures to ensure data integrity are passwords, virus protection, firewall, physical access restrictions, etc. High availability systems aim to remain available at all times, having in-built measures to ensure service continuity despite power outages, hardware failure and system upgrades. This would also involve preventing denial of service attacks. A security system for a high value asset would require features like driver separation to enable stability. The separation of drivers allows for loading of all the drivers running to be spread across the system and having the ability to migrate individual drivers to other computers in the event of a PC or network failure. Continued operation would call for automatic configuration redundancy and power to ensure continued connectivity to systems at all times.

Hence to sum up, an Integrated Security Management System will look to achieve the following objectives:

- Force multiplying impact on security effectiveness to match the threats by using integrated technologies.
- Enhanced survivability of security personnel.
- Enhance overall cost-effectiveness due to reduced manpower and enhanced security. •



To compete in the world market we did a major step forward having accumulated the best industry resources and outstanding engineering expertise in a single corporation. The integration brings us strength to offer the market the best innovative solutions in the balanced product lines in commercial, military and transport aviation. In the challenging environment we grow open and build strong partnerships with the world industry leaders. We never stop nourishing fresh ideas and young talents who dare to look in to the future.

MAKING A MARK ON THE GLOBAL AVIONICS MAP



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Samtel HAL Display Systems Ltd. (SHDS) – a JV between Samtel and HAL aims to address the avionics requirements for all HAL star platforms - both fixed and rotary wing. The JV has achieved the unique distinction of being the first public-private partnership in defence avionics space in India to indigenously design, qualify and serial produce a multifunction display for induction on a fighter aircraft.

Samtel Thales Avionics Ltd. (STAL) is a JV between Samtel and Thales Avionics, and intends to locally develop, customize, manufacture, sell and maintain indigenous Helmet-Mounted Sight and Display Systems, state-of-the-art IRST and modern avionics systems. It will provide the basis for all future aerospace development for Thales in India.

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- Live Demo - TopOwl Helmet Mounted Sight and Display
- Optronics Demo (at Thales-STAL booth)

Boeing's Record-Setting Performance



Boeing has booked 1,203 net commercial airplane orders in 2012, the second-largest number in the company history. The company also delivered 601 airplanes, the most since 1999. Boeing's unfilled commercial airplane orders at the end of the year stood at 4,373, the most in company history.

"Our employees rose to the challenge of executing several production rate increases in 2012—a truly remarkable performance," said Ray Conner, President and CEO, Boeing Commercial Airplanes. "Increasing our deliveries by 26 per cent allowed us to put more airplanes into the hands of our customers and grow our customer base by offering the best products and services."

The 737 programme broke the record for orders for any Boeing model in a single year, accumulating 1,124 net orders. The 737 MAX—the new engine variant of the best-selling 737—recorded 914 of those orders, bringing total orders till date to 1,064. In addition, the Next-Generation 737 set a new single-year record with 415 deliveries to customers worldwide. The 737 programme also celebrated its 10,000th order in 2012.

Boeing's leadership in the wide-body market continued in 2012. The year began with the five-continent 787 Dream Tour and ended with eleven 787 deliveries in December to seven customers. Till date, forty-nine 787s have been delivered to eight customers.

The 777, which totalled 83 deliveries in 2012 and surpassed 1,000 since launch, won 68 net orders. The airplane continues to win accolades from passengers, earning three prestigious awards voted on by business travellers. With 31 deliveries in 2012, the 747-8 Intercontinental and Freighter have received positive reviews from customers and are performing as expected in service.

"As we look ahead to 2013, we're focused on meeting our customer commitments by increasing production rates and delivering high-quality, reliable products and services," said Conner. "We will also transition the 787-9 into production and flight test and work closely with customers, who contribute so much to our success, to continue defining the 787-10X and 777X." •



**ONE PARTNERSHIP.
ENDLESS POSSIBILITIES.**

The 787 Dreamliner's debut for Air India celebrates a historic moment in the 70-year partnership that Boeing shares with India. It heralds a new technologically advanced era for Indian civil aviation. As this partnership continues to soar, the possibilities of what more it will achieve are, indeed, endless.



'We now have Sikorsky S-76C++ helicopters flying in India and all in VIP configuration'



■ Air Vice Marshal (Retd) Arvind Walia, Regional Executive-India & South Asia, Sikorsky



S-92 HELICOPTER

SP's ShowNews (SP's): Can you give a brief background of your company's association with India?

Air Vice Marshal (Retd) Arvind Walia (Walia): Sikorsky's association with India goes back to 1954 when the first helicopter inducted in independent India's Air Force was a Sikorsky. The Sea King helicopters that joined Indian Navy in the early 1970s were licence-built versions of Sikorsky S-61 helicopters.

Sikorsky renewed its presence in India about six years back. We now have Sikorsky S-76C++ helicopters flying in India and all in VIP configuration. We are also responding to the various military requirements of the Indian Ministry of Defence (MoD). Apart from new helicopter sales we have also partnered with the local industry to build, develop aerospace engineering capabilities in India. As you would know, Sikorsky already has strong partnership with the Tata group in India and we have two facilities that are manufacturing aerospace components and cabins for S-92 helicopter. So our association with India goes beyond new helicopter sales. It is a packaged relationship.

SP's: What are the activities you are focusing on currently and how do you foresee the future of association?

Walia: India is an important part of Sikorsky's global supply chain. Sikorsky has developed two manufacturing facilities in Hyderabad, both in partnership with Tata group. One is Tata Advanced Systems Ltd (TASL) for manufacturing S-92 helicopter cabins and the other is Tara, a joint venture with Tata for manufacturing over 4,000 components which can be used for both fixed-wing and rotary-wing aircraft. The completed S-92 cabins are being shipped to Sikorsky manufacturing facility in Pennsylvania, United States, for final assembly. Apart from the manufacturing facilities, we also have relationship with some other companies in India who are working on various engineering and non-engineering projects for Sikorsky. Sikorsky is also looking at forging relationships with defence public sector undertakings (DPSUs) to enhance and augment their existing capabilities in aerospace manufacturing.

SP's: Would you like to elaborate on any specific plans for the country in the next five to ten years?

Walia: The Foreign Investment Promotion Board (FIPB) in November 2012 has given clearance for Tara to undertake additional activities related to design, de-

velopment, engineering, manufacturing, and testing of fixed- and rotary-wing military aircraft. Now that we have the defence licence, we will enhance the scope of work of the joint venture and move ahead with manufacturing more content for the aerospace industry, in a phased and timed manner.

Sikorsky has prepared a roadmap to make India a manufacturing hub for critical, high precision components that would be used for aviation industry. We have successfully crossed the first two major milestones of the roadmap and if things move at the current pace and subject to economic conditions improving worldwide, Sikorsky would be able to produce a helicopter here in India.

SP's: What all makes you feel that India is an exciting market?

Walia: India as a country has a huge potential for inducting new helicopters both in the military and commercial sector. Our estimates point to over 1,000 plus new helicopters for defence alone in the next decade or so. India also has some aerospace manufacturing capabilities which can be further enhanced and augmented to make them global companies. I am also very upbeat on the talent pool that is present and available in India. The young engineering minds of today are the best in the world and they would certainly add value to any original equipment manufacturers (OEM) they work for.

SP's: What capabilities you plan to showcase during Aero India being held in Bengaluru?

Walia: At Aero India 2013, our focus is on highlighting the pioneering and proven Sikorsky products and services, the partnerships that Sikorsky builds around the world and the best practices in technology and manufacturing processes being introduced in India.

SP's: Would you like to refer to any important innovation of your company at this point?

Walia: Well certainly, Sikorsky is the leader in innovation in helicopter industry. Sikorsky has developed the X2 technology, which enables speeds of 250 knots and above without compromising on vertical take-off capability of a helicopter. Our prototypes have been very successful and we are now working on a platform called S-97 Raider, based on the X2 technology. You will hear successful test reports for the Raider in the days to come. •



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CAE ab initio flight schools at Gondia and Rae Bareilly train to international standards

The CAE Oxford Aviation Academy combines the resources of the former CAE Global Academy and Oxford Aviation Academy, which CAE acquired in May 2011, to comprise 11 ab initio flight training schools worldwide with the capacity to train 2,000 pilot cadets annually. Two of the flight schools operate in India – Gondia and Rae Bareilly.

CAE Oxford Aviation Academy, Rae Bareilly, also known as the Indira Gandhi Rashtriya Uran Academy (IGRUA), is managed by CAE on behalf of the Civil Aviation Authority of India. Through this collaboration, the flight school infrastructure and aircraft fleet have implemented internationally standardised modern methodologies of aviation training. In 2010, CAE Oxford Aviation Academy, Rae Bareilly, became the first ground training school in India to be ISO 9001:2008 certified.

Rae Bareilly has more than doubled its annual intake in the past two years. A new hostel commissioned in 2009 increased the capacity to 288 students.

CAE Oxford Aviation Academy, Rae Bareilly, offers the largest aircraft training fleet in India. These include high-performance single-engine aircraft equipped with modern avionics, turboprop C90-A King Air aircraft, and Diamond aircraft with state-of-the-art glass cockpits. The flying and ground instructors have many years of instructional experience.

CAE Oxford Aviation Academy, Gondia, also referred to as the National Flying Institute, offers a first-class training and living environment focused on developing airline pilots. Training resources include modern trainer aircraft, advanced flight simulation training devices, well-equipped classrooms, extensive online materials, and dedicated instructional staff and academy management team.



The new campus offers one of the highest standards of flight schools in the world. All residential accommodations, classrooms, cafeteria and administration facilities are recently built, and the campus is improving continuously.

CAE Oxford Aviation Academy, Gondia, is a joint venture of CAE and the Airports Authority of India. •

Embraer EMB 145 AEW&C

The EMB 145 airborne early warning and control (AEW&C) is an advanced and affordable airborne early warning and control aircraft available in the market. It is a blend of Embraer's proven and cost-effective ERJ 145 platform, with a unique, high-performance, multi-mode active phased-array AEW radar, a powerful command and control system and a comprehensive set of support systems like ESM, self-protection and communications including data links.

The core of the EMB 145 AEW&C is a compact state-of-the-art mission system. Built by Ericsson Microwave, the ERIEYE AEW system has intelligent sensor technology and a user-friendly command and control system, capable of quickly acquiring accurate and comprehensive information.



with excellent results. With an instrumented range of 450 km, the AEW radar will detect and track targets long before they become a threat. The IFF interrogator, associated with supporting C2 databases, provides fast and reliable target identification. Finally, the advanced data links allow all these vital data to be disseminated in a timely manner throughout the battlespace to all units that need them. In the end, decision-makers have the information they need at the time they need it.

PROVEN CRAFT

The EMB 145 AEW&C is currently in operation with the Brazilian Air Force, carrying out aerial surveillance, mission coordination, aircraft vectoring and other missions in the Amazon basin. The EMB 145 AEW&C

has also been delivered to Greece, where it provides the Hellenic Air Force with early warning and control capabilities compatible with the NATO environment, and to Mexico, to be used in its border surveillance programme.

INDIAN PROGRAMME

India took delivery of the first Embraer 145 AEW&C, built with Indian technology in August 2012. The first of the three AEW&C aircraft comes equipped with India's first-ever airborne active electronic scanned Array (AESA) radar, giving it the capability to detect missiles and hostile fighters at all angles.

The new EMB 145 would have "the airborne Active Electronic Scanned Array (AESA) radar designed by DRDO's Bengaluru-based Centre for Airborne Systems (CABS)" mounted on top of the modified aircraft, said Programme Director Christopher at the ceremony.

India and Brazil had signed a deal worth \$210 million for the supply of three aircraft by 2014. This includes a comprehensive logistic package that entails training, technical support, supply of spare parts and ground support equipment. •

LATEST DEVELOPMENTS IN SENSORS AND SYSTEMS

The radar system can detect and track both sea and airborne targets, over land and water, all with an impressive instrumented range.

An electronically scanned radar beam overcomes the limitations of rotating antennas through faster beam-pointing to the target or area, a characteristic only possible with active phased array technology. This gives the radar the ability to adapt the transmission waveform according to target dynamics and background clutter. The result is exceptional performance to simultaneously track multiple air and sea targets while protecting the radar from single failure with graceful degradation capability.

AIRBORNE EARLY WARNING

The primary mission of an AEW platform is to detect, track and identify targets in its patrol area and forward these data so as to give friendly forces an accurate and comprehensive operational picture. The EMB 145 AEW&C performs these tasks

THE LEGENDRY WARRIOR (RUDRA)



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In 1996, Bombardier established the Government and Special Mission Aircraft Department, now Specialised Aircraft Solutions, to address the distinctive requirements of governments. Bombardier SAS made its inaugural delivery – the first of five Global Express aircraft destined for the United Kingdom's Royal Air Force (RAF) under the Airborne Stand-off Radar (ASTOR) programme and one Challenger 604 aircraft to the Korean National Maritime Police (KNMPA).

SAS has delivered over 300 aircraft to more than 35 different governments worldwide for the following specialised mission applications: C4ISR; maritime patrol and search and rescue; executive transport and logistics support; flight inspection; aircrew training; Medevac and flight test.

With more than 300 aircraft delivered, Bombardier Specialised Aircraft Solutions has a proven ability to deliver turnkey solutions on time and on budget. A dedicated team of in-house engineering resources focuses its extensive expertise and know-how on meeting special mission requirements, and all one-stop shop. Through its experience in over 35 countries, it has built the specialised knowledge needed to manage the complexities of government programmes.

C4ISR

Government agencies and military commanders around the globe rely on Bombardier's proven C4ISR platforms for high-altitude surveillance and domain awareness; maritime patrol; command, control and communications; and tactical and strategic reconnaissance.

APPLICABLE PLATFORMS

Bombardier's industry-leading C4ISR platforms include the wide-body Global and Challenger aircraft, the agile Learjet family and the dependable Q-Series turboprops. These specialised aircraft are being used by, among others, the Royal Air Force – Global Express (ASTOR programme); Royal Danish Air Force – Challenger 604; and Korean National Maritime Police Agency – Challenger 604.

Government organisations around the world consistently turn to Bombardier platforms to meet their unique requirements. The flexibility, endurance, range and payload of our aircraft make them highly suitable for marine patrol and search and rescue. Government agencies that have trusted Bombardier aircraft with the task of maritime patrol include: Coast Watch (Australia) – Q200 and Q300 Series; Swedish Coast Guard – Q300 Series; Japan Coast



RAF's ASTOR

Guard – Q300 Series; Canadian Coast Guard – Q100 and Q200 Series; and US Department of Homeland Security – Q200.

MEDEVAC

When lives are at stake, Bombardier platforms are called upon to transport patients to and from medical facilities. Specially modified aircraft provide doctors and nurses with everything they need to ensure patients arrive safely and, if need be, perform emergency treatment, including surgery, en route.

Customers who rely on Bombardier aircraft for their Medevac needs include: Quebec Government – Challenger 601; REGA Air Swiss Ambulance – Challenger 604; Irish Air Corp - Learjet 45XR; Canadian Global Air Ambulance - Learjet 35A; and Saudi Armed Forces Medical Services - Learjet 35. •

IndiGo Becomes the First Indian Airline with Sharklet Equipped A320



India's largest airline, IndiGo has taken delivery of its first A320 aircraft equipped with Sharklet fuel-saving wing-tip devices, becoming the first Indian carrier to do so. Sharklets are newly designed wing-tip devices that improve the aircraft's aerodynamics and significantly cut the airline's fuel burn and emissions by four per cent on longer sectors.

Sharklets are an option on new-build A320 Family aircraft, and standard on all members of the A320neo Family. They offer the flexibility to A320 Family operators of either adding around 100 nautical miles more range or allowing increased payload capability of up to 450 kilograms. All future A320 aircraft to be delivered to IndiGo shall be fitted with the Sharklet wing-tip devices.

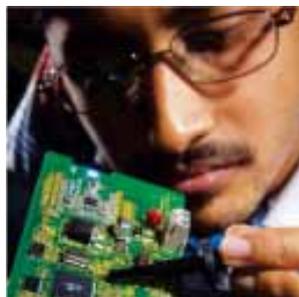
"In little over six years since we began operating, our low fares and high service ethos at IndiGo has enabled us to grow to become India's largest domestic carriers. We already operate one of the world's youngest most fuel-efficient fleets and our investment in Sharklet will help reduce our fuel consumption even further," said Aditya Ghosh, IndiGo's President.

IndiGo placed an order for 100 A320 aircraft in 2005. In addition IndiGo was the first Indian airline to order the "neo" with a contract for 150 A320neo and 30 A320s placed in 2011.

"With high fuel prices and with a four per cent fuel burn reduction, IndiGo's investment in the Sharklet will pay handsome dividends, said John Leahy, Chief Operating Officer, Customers. "We are delighted with IndiGo's choice to grow their airline with Airbus."

IndiGo is an all-Airbus operator and the largest low-cost airline in India today. It began operations in 2006 and has a fleet of 62 A320s today. So far IndiGo's cumulative order for Airbus aircraft is for 280 A320 Family aircraft including 130 A320neo. •

technology to perform



Our ideas, like our technologies, take flight over India every day.

Over 40 years ago, Honeywell began its investment in India with a vision to strengthen both our presence in India and our strategic relationships with Indian industry. Today, our commitment to India continues, with thousands of employees focused on delivering new technologies that reduce lifecycle costs while improving safety and efficiency. Working with the government, continues to deliver innovative new products, services and technologies that make aviation safer, smarter and more energy efficient - for today and for the future.

Honeywell

Rockwell Collins Solving Design Challenges for Mobile, Ad Hoc Networks



BY DR ALAN C. TRIBBLE,
PRINCIPAL MARKETING MANAGER, ROCKWELL COLLINS

In developing mobile, ad hoc networks (also known as MANETs) for tactical communications, a design team has a lot to consider. It must figure out how to deliver the networking capabilities users need in a product that can withstand the often severe conditions in which it must operate. It also must work within the customers' budget constraints.

The balance that designers try to strike is to create a solution that performs exceptionally well in all the capabilities its users will need, with no excess to compromise efficiency and cost-effectiveness.

So what are some of these capabilities? Let's define those typically seen in MANET systems.

Network formation – how fast a network can form, and the ease with which it can enter and exit nodes of communication.

Routing – how well a network enables communications between any two nodes, particularly those that have no direct radio-frequency connectivity.

Scalability – the ease with which a network can admit large numbers of simultaneous users with no degradation of operability.

Quality of service – how well a network prioritises messages so that the most important ones have the highest chance of successful transmission.

Security – a network's ability to both authenticate telecommunications and to protect them from unauthorised users.

These capabilities are affected by real-world limitations and other issues associated with radio communications. Examples are available user data rates and the presence of hostile entities that seek to disrupt or infiltrate MANET operations.

MATCHING SOLUTION WITH ENVIRONMENT

Two types of solutions present themselves in designing MANETs. The first involves approaching MANET design separately from the radio frequency component. This enables a system to work with customers' legacy radio equipment for efficiency and cost-effectiveness.

Rockwell Collins' SubNet Relay networking technology takes this approach. It is a masterless, self-configuring data networking solution that works with currently fielded HF/VHF/UHF line-of-sight radios. This capability is particularly useful for providing cost-effective, reliable and seamless communications among the maritime assets of multinational forces.

Why maritime? Think of the relative ease with which you can achieve line-of-sight connectivity at sea, where an antenna 10 metres above the surface can have an unbroken line of sight to a node that might be more than 20 kilometres away.

SubNet Relay also enables air, ground and fixed-site assets to join the network in environments with relatively minimal line-of-sight obstructions. If this is your anticipated environment, SubNet Relay does the job exceptionally well.

The second solution type involves integrating MANET protocols directly into the radio design. The FlexNet™ family of software-defined radios – jointly developed by Rockwell Collins and Thales – is an example of this approach.

Combining MANET and radio technology – including waveforms – enables robust capability in operational environments that are complicated by any or all of

three main challenges: jamming, fast movers and terrain. Because it integrates technologies into one unit, FlexNet also presents a small, lightweight footprint.

Future Indian Army programmes such as the Battlefield Management System, Army Software Defined Radio, Tactical Communications System and others will have applications involving ground forces in urban settings, where they are likely to encounter all three challenges. This much more complex operational environment will tend to demand the capabilities afforded by FlexNet's integrated approach to MANET design.

THE BIG THREE

Let's take a closer look at the three main operational environment challenges that designers must consider in creating an integrated MANET solution such as FlexNet.

Jamming – tactical communications in a threat environment can count on adversarial attempts to jam them. Anticipating this, effective protection or response will depend on the type of jamming, or the method jammers use to introduce "noise" into the environment.

For instance, suppose the adversary uses a follow-on jammer, which pinpoints a transmission frequency in use by friendly forces, then floods it with noise. A MANET design with frequency-hopping capability can thwart the jamming attempt.

Such capabilities must be hard coded into the radio waveform, however. Once coded in this way, it's difficult to change them without also altering other capabilities in sometimes undesirable ways.

Fast movers – these don't just include fast jets. They also can be ground vehicles and helicopters that move through urban environments or mountainous terrain, rapidly losing and reestablishing their line of sight with one another.

When these assets are network nodes, their quick movement into and out of the network demands a MANET with high processing speed. Commercial network solutions typically cannot reach the processing speeds that a military solution such as FlexNet can.

Terrain – compared with a maritime environment, where line of sight can go on uninterrupted for tens of kilometres, terrain in ground environments can pose major challenges for MANETs. Consider the peaks and valleys of the Himalayas, but also the urban environment of places such as Mumbai.

Like mountains, city structures create line-of-sight problems. What's more, the metal in buildings causes multi-path issues for MANET transmissions. As a result, waveform designs for MANETs operating in urban environments are necessarily complex.

The key to successful MANET design is in applying to technological capability the knowledge of what users will need a solution to do, where they will operate, what challenges they will face, and how those challenges might change over time.

Today's operational scenarios feature more complexity than ever, along with real-world budgetary issues that will affect design and procurement decisions alike. This is where design ingenuity and experience can triumph over challenges, providing MANET solutions that are trusted, critical components of any mission. •

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India's Joint Programmes with Russia On Track



INDIAN SPECIALISTS WORKING ON THE MTA PROJECT IN RUSSIA

BY SP'S CORRESPONDENT

India and Russia currently are working together on many joint projects, but two of them are very important for India for the ability to develop its own indigenous capability in high-tech. The first is the FGFA programme, that is progressing quite well.

Very recently in January PAK FA No. 4 flew 7,000 kilometres from Komсомolsk-on-Amur to Zhukovsky (with two intermediate landings in Abakan and Chelyabinsk). The pilot noted reliable performance of all systems and engines. This is a major milestone, as this is the first time the aircraft has flown for such a long distance.

Today four aircraft are already participating in on-ground and in-flight test programme, with more than 200 flights performed by present time. PAK FA is the basis for fifth-generation fighter aircraft (FGFA).

Meanwhile, the joint work on the FGFA is close to another major milestone – the signature of the R&D agreement between India and Russia. The front-end design is almost completed, there are only some details left and work on preparation of the R&D agreement is in full swing and is close to the finish line.

The Russian Air Force is expecting for the trials of the fifth-generation PAK FA fighters to start at the testing facility in Akhtubinsk in mid-2013. Four machines are already being tested at Zhukovsky Airfield in the Moscow region, and the fifth one is ready for acceptance. Soon all five machines will fly to Akhtubinsk to begin government testing. The rest of the machines will be delivered there from the factory. By the end of 2013, it is expected that eight PAK FA fighters will participate in the trials in Akhtubinsk.

The FGFA programme can become another successful and iconic project of Russian-Indian cooperation, much as the Su-30MKI programme. Along with fast economy growth, India's demand for armaments increases. In addition, this programme will help to become a manufacturer of aircraft and obtain new technology from its partners in order to protect the country from being dependent on importing military equipment. On the other hand, Russia has vast experience in versatile weapons platforms production and the know-how as well as fine record of cooperational projects with India. Russia seems to be best choice of partner helping to ensure safety of Indian boundaries.

Another programme that is a little bit in the shade of the FGFA development, but nevertheless important, is the MTA – multirole transport aircraft development.

This aircraft is being developed in accordance with the intergovernmental

agreement signed between Russia and India in September 2012. This agreement established that the project would be a 50:50 venture between the countries. Russia is represented by its arms export agency Rosoboronexport and JSC "UAC-Transport Aircraft", India by its Hindustan Aeronautics Ltd., a key partner in the programme.

According to the inter-governmental agreement signed by Russia and India, the parties will purchase 100 and 45 MTA respectively.

The MTA project progress in full compliance with the schedule. Recently our team has brought another stage to an end – a group of Indian experts completed additional education and was certified for work according to Russian standards. The work was launched in December 2012. Indian engineers will stay in Moscow about 10 months.

The production will be set up both in India and in Russia. It is planned that the first flight will be made in 2017 and serial production will be launched in 2019. The MTA is envisaged as offering a payload capacity of up to 20 tonnes. The aircraft will be fitted with a glass cockpit, FADEC and fly-by-wire systems. The MTA will have a maximum flight speed of 800 kmph and range of 2,500 km.

These two programmes give Russia and India a solid foundation to further develop cooperation and perhaps bring it to the sphere of civil aviation, where engineers from India with their unique competences can broaden the field of cooperation even further.

Russia is currently working on two major programmes in civil aviation – the SSJ 100 regional 100-seat aircraft and the MC-21 – medium haul narrow body aircraft family.

The SSJ 100 programme is on track to increase this year's deliveries to over 20, our next civil programme, the MC-21 narrow-body aircraft is in the active stages of design and testing and it is planned that first aircraft will be delivered in 2017.

Indian economy is developing quite fast, it's among the fastest in the world. Business requires increased capacity and routes from air transportation, thus igniting growth for domestic or regional travel. Considering the growth dynamics and additional routes, the market demand for aircraft in the 60 to 120-seat category can reach 300, of which around half will be 90 to 120-seaters. That's why we view the Indian market important not only for our military cooperation programmes, but for the civil ones as well, as we see the SSJ 100 a good fit for India. Indian business could participate in local MRO activities for the aircraft as well as bring its own unique expertise to the MC-21 project. •

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KING AIR 250



'We can offer India a unique combination of experience and innovation that can help to improve the capability of our customers'

■ John Gay, Senior Vice President, South Asia-Defence, Rolls-Royce

SP's ShowNews (SP's): Can you give a brief background of your company's association with India?

John Gay (Gay): Rolls-Royce has a long and proud history of partnership with India. In 1932, the company supplied Gipsy engines to power Dragon Rapide DH-89 aircraft operated by the Tata Airlines, the forerunner to Air India, and began a relationship with India that has continued to grow ever since.

Today, there are over 1,300 Rolls-Royce engines in service in India, mainly as a result of long-term defence programmes. However, all four of the company's global market sectors—civil aerospace, defence aerospace, marine and energy—are well represented. In the defence sector, Rolls-Royce celebrates the 80th anniversary of its partnership with the Indian Air Force in 2013.

However, our activity in India has expanded far beyond the supply of engines. Rolls-Royce has played a key role in the development of India's indigenous aerospace industry, largely through our partnership with the Hindustan Aeronautics Limited (HAL) in Bengaluru, which is now in its 57th year.

Most recently, we completed construction of a new manufacturing facility in Bengaluru for our International Aerospace Manufacturing Pvt Ltd (IAMPL) joint venture with HAL, which will produce important components for the Trent family of civil engines.

SP's: What are the activities you are focusing currently and how do you foresee the future of association?

Gay: On the defence side, I think we can offer India a unique combination of experience and innovation that can help to improve the capability of our customers. We have a broad-based portfolio of engines that means that we are able to offer power solutions for the new tanker programme, additional trainer and transport aircraft, the light utility helicopter and unmanned aerial vehicles (UAVs).

We also feel that the technologies and techniques that we have developed in our services business can further improve the capability and through-life cost of our large installed engine fleet here.

SP's: Would you like to elaborate on any specific plans for the country in the next five to ten years?

Gay: In terms of new engine sales, we are hopeful that the requirements for additional AE 2100-powered C-130 aircraft and Adour-powered Hawks will be confirmed shortly. The AE 2100 engine is also the powerplant for the C-27J aircraft which is also under consideration by the IAF, and would offer significant commonality benefits if selected alongside the C-130J fleet.

For the tanker programme, the Trent 700 offers real performance benefits for the A330 tanker aircraft that was recently selected for the IAF. It delivers unrivalled operational benefits in the "hot and high" conditions that are part of normal operational requirements in India and is proven to offer significant reductions in life cycle cost for the IAF mission requirements. We were delighted with the performance of the engine during the flight trials for the MRTT where the Trent 700 engine was able to demonstrate its capabilities

to the IAF in India. In addition, there are several ongoing helicopter campaigns in which we have a keen interest, including the LHTEC CTS800 as a potential powerplant for the light utility helicopter.

We are also looking to work more closely with the Indian armed forces to enable them to benefit from some of the innovative support techniques that have been proven in other areas of our business, such as marine and civil and which are now being widely adopted by military customers looking to maximise the efficiency and effectiveness of their fleets. This is equally relevant both for new engines as they enter service, or for existing products in service such as the Gnome engine powering the Sea King fleet.

SP's: What all makes you feel that India is an exciting market?

Gay: India is a cornerstone of our defence business and as I mentioned earlier, we have been partnering with the armed forces and industry here for a very long time. India is undergoing a period of significant infrastructure investment and armed forces modernisation and there is a good synergy between where India wants to go in terms of defence procurement and support and what we are able to offer both in terms of engines and services.

SP's: What capabilities you plan to showcase during Aero India being held in Bengaluru?

Gay: Aero India gives us a great platform to showcase our technology and products and to meet with a large number of our customers and partners. As our in-service fleets continue to increase we are looking to strengthen our local partnerships to deliver greater levels of support to the benefit of the customers here.

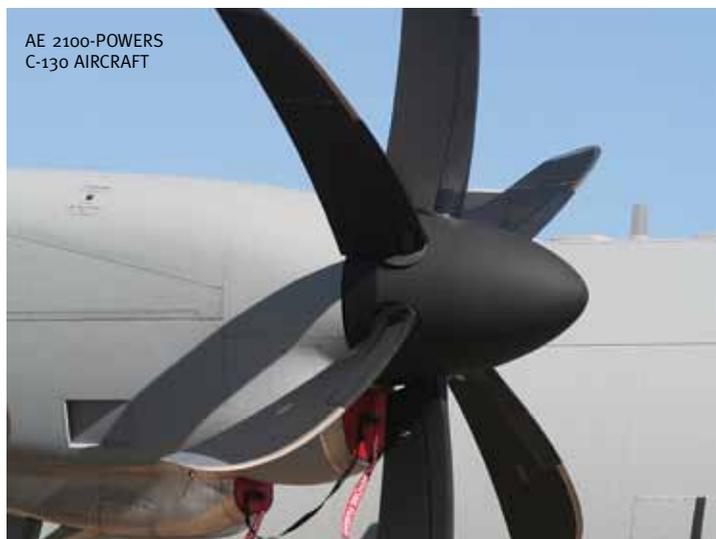
The touch screen technology featuring on our stand will enable visitors to gain a new insight into the capabilities of the portfolio of Rolls-Royce defence engines which power aircraft in all market sectors. In addition, new iPad-based technology will be used to highlight our expansive services capability and offer visiting customers analysis of how initiatives such as fuel management may help to improve operational performance and reduce costs.

In addition, we will be showcasing the Adour Mk871 which powers the Indian AJT and is assembled and tested in India by HAL, and the LHTEC CTS800 helicopter engine which is being offered to power the light utility helicopter.

SP's: Would you like to refer to any important innovation of your company at this point?

Gay: Innovation is part of our DNA at Rolls-Royce. We invest nearly £1 billion per year on research and technology and we are uniquely placed to leverage that technology across our four business units. That means that our defence customers in India can benefit from engine and services technologies developed in our civil, marine and energy businesses.

We will continue to combine technology, our unique experience of the Indian market, and new local partnerships to deliver further improvements in capability and affordability for our Indian customers. ●



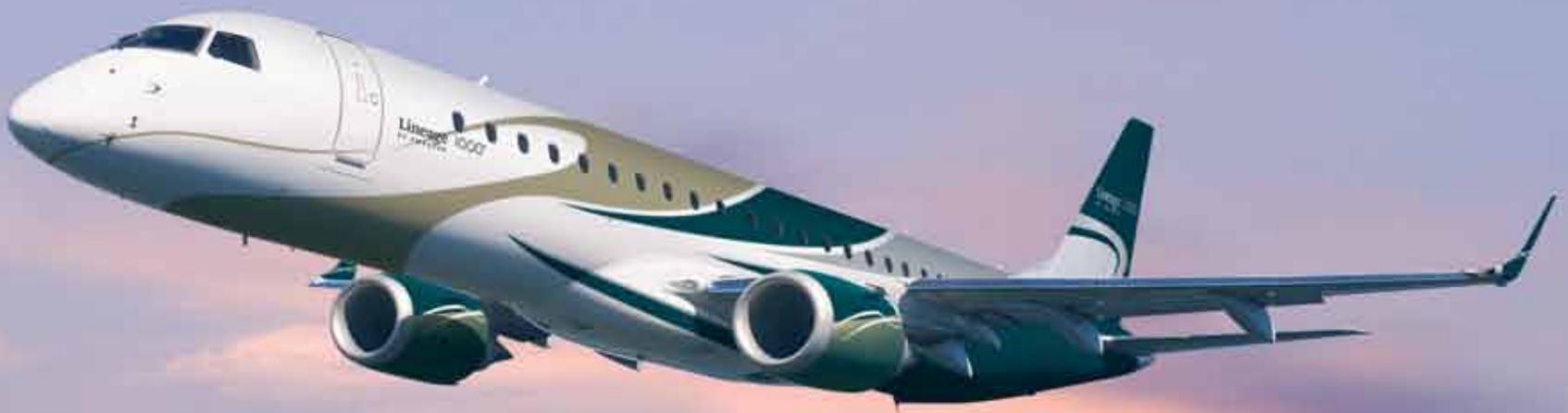
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FOR THE JOURNEY



Executive Jets

RUSSIANS IN BANGALORE: Cost-effective multi-mission capabilities for India

For Russian arms manufacturers, the year 2013 begins with the Aerospace Show in Bangalore – a very important and responsible event. Russia's state arms exporter Rosoboronexport traditionally takes part in this representative international air show. At AERO INDIA 2013 the Rosoboronexport's delegation presents increased number of major Russian airborne and air defense systems and will discuss military-technical cooperation with India and other countries of the region to the common benefit.

BY SP'S CORRESPONDENT

In defence cooperation with India we came over, de facto, from traditional sales pattern to joint development and co-production of high technology wear: a preliminary design phase of the fifth generation fighter programme is successfully completed, work on the multi-role transport aircraft (MTA) is progressing on schedule, a Brahmos supersonic missile is to be integrated by the Indian side intends onboard the Russian airplatform, – said Viktor Komardin, Deputy Director General of Rosoboronexport and head of the delegation at the exhibition. – It is with Russia that India works jointly on truly exclusive, large-scale and potentially ambitious projects. The answer to it is simple: no country, except Russia, is willing to give India advanced military technology.”

Indeed, given the growing technological, industrial, and scientific potential of the two countries, our military-technical cooperation is bound to move to a qualitatively new level. First of all, this is possible through in-depth cooperation and joint research and development activities, establishing an effective service and after-sales service system, joint entry into third-country markets. Both countries have the opportunity to set up joint ventures to manufacture equipment components for all branches of the Indian Armed Forces. The benefits are obvious: this approach helps reduce costs, receive and implement new technologies, including dual-use technologies, and efficiently organize transfer of military technology to the civilian sector.

In general, India and Russia implement such large-scale projects, while traditionally maintaining strong friendly relations established decades ago. So this collaboration has bright prospects. Especially as the huge experience accumulated over decades helps us find common ground even in the most difficult situations. Together we maintain efforts to improve the quality of interaction, adapt to the changing needs and demands of each other.

The issues relating to the implementation of these projects are being raised at meetings in Bangalore. Besides, it was planned to continue discussions on further modernization of Su-30MKI fighters, to up-grade almost all aircraft



YAK-130 COMBAT TRAINER AND
MIG-35 COMBAT AIRCRAFT



KA-226T MULTI-PURPOSE HELICOPTER



IL-76MD-90A TRANSPORT AIRCRAFT

components. Other topics associated with cooperation in defence industry are being evaluated now.

Experts can not ignore also displayed items of the Russian defense industry at the show stand. For example, Rosoboronexport provides information on the Yak-130 combat trainer aircraft, Il-78MK-90 tanker plane, newest Il-76MD-90A transport aircraft, Be-200 multi-purpose amphibian and other flying vehicles. Special attention will be paid to the newest Il-76MD-90A, which was ordered by the Russian Ministry of Defence in 2012. With this new aircraft Rosoboronexport is planning to take the significant market share in Asia.

Rosoboronexport also provides information on variety of Russian helicopters and is expecting speedy evaluation of another tender to supply 197 reconnaissance & surveillance helicopters to the Indian Army. Russia is participating in it with the Ka-226T multi-purpose helicopter, which, to Rosoboronexport view, is perfect for carrying combat missions specified by the customer. It is not only best characteristics of the helicopter is attractive, but also the offset program proposed by Russia.

Prospects for building up an anti-aircraft and missile defense system for India, without which it makes no sense to talk about reliable state security, are also a topical issue at the airshow. According to Russian exhibitors, this area is very promising for the development of a military-technical dialogue with India. Russia's experience in the field is fundamental. A wide range of battle-proven systems capable of protecting administrative centers, infrastructure facilities and military installations in India against air attacks is presented in Bangalore: Antey-2500 long range air defense missile system, Tor-M2E and Buk-M2E medium range systems, and Pantsir-S1 for short range protection.

In general, as to Russians, AERO INDIA is one of the most representative, specialized shows in the Asia-Pacific region. For Russia, participation in it is tradition and a tribute to the strategic partnership of the highest level. So this year AERO INDIA is to give a strong new impetus to the successful relations between Russia and India in the defence sphere. •



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Pawan Hans Diversifies

Pawan Hans Limited, A Government of India Enterprise, is India's leading helicopter company and is known for its reliable and safe helicopter operations. It commenced operations in 1986 to provide helicopter services to the oil sector, operate in hilly and inaccessible areas and make available charter flights for promotion of travel and tourism.

The organisation has recently added 15 new helicopters comprising of 10 Dauphins N3, 03 AS350-B3 and 02 Mi-172 Helicopters to its fleet, spreading its wings into various fields. They include: Helicopter Services; Operations and Maintenance Activities; Pawan Hans Helicopter Training Institute (PHTI); National Institute of Safety and Services (NI-ASS); Heliports at Rohini, Delhi and Hadapsar, Pune; and venturing into sea planes & small fixed-wing aircraft operations.



Meerut, Ghaziabad, Muzaffarnagar, to provide helicopter connectivity from the national capital. The project is ready to be rolled out shortly. With a view to further promote tourism from the national capital and for the sake of passenger convenience, Pawan Hans is also planning to provide helicopter services to major cities closer to Delhi, viz. Jaipur, Dehradun, Haridwar, etc.

The Pawan Hans Helicopter Training Institute (PHTI) is approved by the Director General of Civil Aviation for imparting ab-initio training in the field of Aircraft Maintenance Engineering. The course conforms to the approved ab-initio training in the field of Aircraft Maintenance Engineering to prepare candidates to appear for basic licensing examinations conducted by DGCA.

Pawan Hans is developing state-of-the-art Heliport in Rohini, (Delhi) and Hadapsar, (Pune). This heliport would be equipped with all modern facilities in sync with the requirements of an airport, viz. passenger terminal, firefighting, ambulance, modern navigation instruments, parking bays for multiple helicopters, baggage screening, X-ray and other requisite facilities.

Pawan Hans is CAR 145 approved organisation with qualified and experienced engineers and technical staff for the maintenance of different type of helicopters i.e. Dauphin SA 365 N and N3, Mi-172, Bell 206 L4, Bell 407 and Ecureuil AS 350 B3 based and operated from different locations, all over the country.

Pawan Hans is developing state-of-the-art Heliport in Rohini, (Delhi) and Hadapsar, (Pune). This heliport would be equipped with all modern facilities in sync with the requirements of an airport, viz. passenger terminal, firefighting, ambulance, modern navigation instruments, parking bays for multiple helicopters, baggage screening, X-ray and other requisite facilities.

GOING PLACES

With a mix fleet of 54 helicopters, Pawan Hans has been the backbone of India's offshore industry since 1986. Company has flown over 4,50,000 hours of offshore flying and done over 20,00,000 offshore landings, flown over 90,00,000 passengers for India's E&P sector. It has been the lifeline connecting remote and inaccessible areas in the hilly terrains of the North East and connecting inter islands with the main land in Lakshadweep Islands and Andaman & Nicobar Islands.

HELI-PILGRIMAGE

Pawan Hans has been providing regular helicopter services to Mata Vaishno Devi shrine at Katra, Jammu, and seasonal services to Sri Kedarnath and Sri Amarnath shrines. Pawan Hans would increase its flight frequency in future and has also planned to extend this service to Mathura and Agra, providing a better connectivity option to tourists, pilgrims and business travellers.

Pawan Hans has also surveyed various other cities close to Delhi, viz.

NEW VENTURES

To provide a wide umbrella of services to passengers and expanding the brand, Pawan Hans is also planning to provide 'Fixed Wing Aircraft' and 'Sea-Plane' services. The company would provide connectivity by small Fixed Wing Aircraft to various small towns, which need to be connected with major cities. For the first time in India, Pawan Hans launched the Seaplane operations and now has plans to launch seaplane services in various states and UTs. •

STAR PERFORMERS: Embraer Legacy 450, 500 & 650



The Hurun Report has named the Legacy 650 as the large-size business jet star performer in the recent Ninth Hurun best of the best awards ceremony in Shanghai, China. The Report also named the Legacy 500 the best new arrival in business jets in January 2012. The move adds another distinguished award to the four received in the last 12 months from luxury publishing brands. Since 2007, Embraer Executive Jets have received more than a dozen international design and innovation awards. The Hurun Report is read by China's high-networth individuals and is considered one of the most influential publications of the luxury genre in the country.

"We have brought several new and innovative features with each of the business aircraft we have offered on the market and it is very rewarding for them to be recognised by the Hurun Report," said Ernest Edwards, President, Embraer Executive Jets. "Clearly, our reliance on customers to help design their

ideal aircraft is an effective strategy and is reflected in the recognition by our most challenging analysts—the worldwide luxury and aviation press. This is an outstanding achievement for any business aviation company."

In addition, in May, the Legacy 500 and the Legacy 450, Embraer Executive Jets' latest, clean-sheet designs, received the foremost luxury brand award by *GaFencu*, a leading luxury and lifestyle magazine, while the Legacy 650 was given away the best executive jet award by the Robb Report, one of the top luxury and lifestyle media brands. Finally, the Legacy 650 also received the best executive jet brand award by *Insider Report*, a key influential lifestyle publication.

The awards confirm the market acceptance and leadership position of Embraer Executive Jets in China. The Legacy 650 was chosen by Jackie Chan, renowned Hollywood film star, for his international transportation. Chan was later named the brand ambassador for Embraer Executive Jets. •



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Samtel's Expanded Range of Capabilities

Samtel Avionics & Defence Systems (SA) – India's first complete avionics firm in private domain, along with its joint venture companies – Samtel HAL Display Systems (SHDS) and Samtel Thales Avionics (STAL) will be showcasing its wide array of avionics products and expanded range of capabilities at Aero India 2013. For the first time in India, Samtel will have live demos of TopOwl Helmet Mounted Sight Display for helicopters, demo of Head Up Display (HUD) system and live demo of Optronics at the Thales-STAL booth.

Puneet Kaura, Executive Director, Samtel Avionics & Defence Systems, said, "We are moving ahead on our commitment to emerge as India's first complete avionics firm in private domain. As the focus of the defence and aerospace companies across the world shifts to India and its indigenous capabilities, Samtel is gearing up fast to enhance its competencies and gamut of products to meet their requirement. We are glad that Samtel is at a stage that it can offer a repertoire of state-of-the-art avionics displays and advanced systems to meet the customised requirements of the worldwide aerospace industry."

Samtel is displaying the following products:

TopOwl Helmet Mounted Sight and Display:

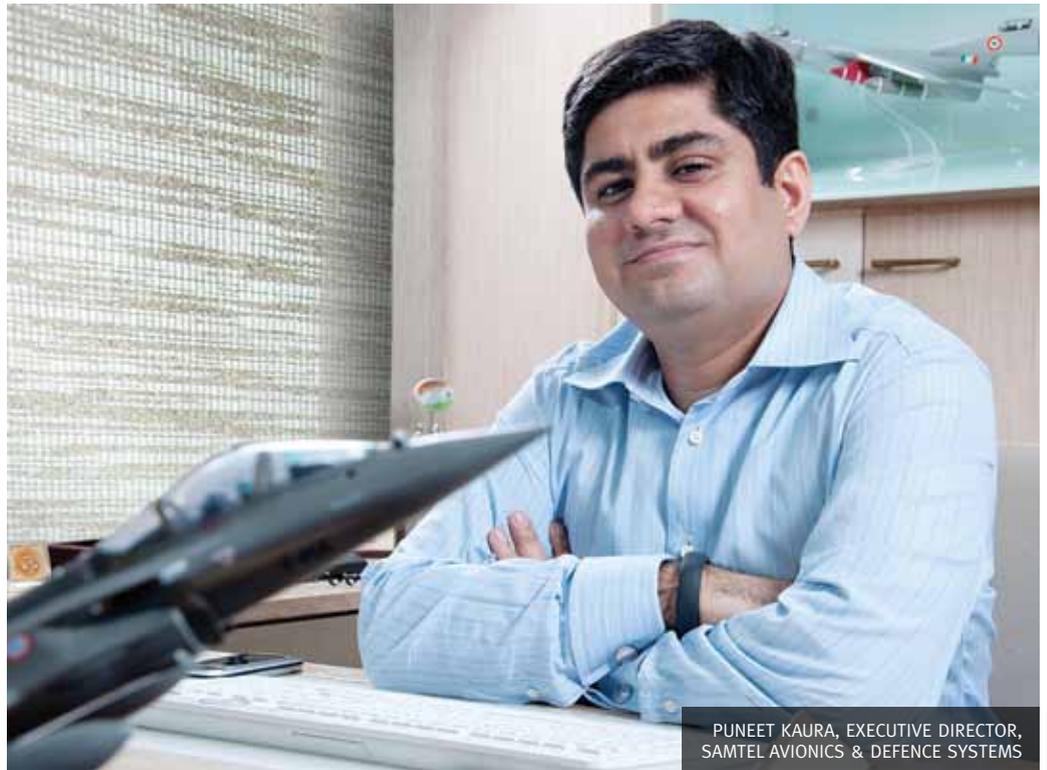
The TopOwl Helmet Mounted Sight & Display for helicopter piloting/targeting will be available for a live demo. TopOwl is combat proven and is already equipped on six major helicopter platforms across 16 countries.

Optronics capabilities: While the live demo of the Optronics product will be at the Samtel-Thales JV booth at Thales, a demo film showcasing its capabilities will be run at the STAL booth within the Samtel stall.

Head Up Display (HUD): For the first time at any air show, the indigenously developed Head Up Display will be showcased.

Multifunction Displays and Smart MFDs: With the productionisation of colour MFDs for Su-30MKI Block-III & Block-IV production aircraft at Samtel's DGAQA qualified manufacturing facilities, the Samtel HAL JV has achieved the unique distinction of being the first public-private partnership in defence avionics realm in India to have a primary cockpit display qualified and productionised for induction on a fighter aircraft. Samtel booth will have the 5"x5" MFDs and its variants on display along with 6"x6" MFDs. Also showcased will be the next-generation large-size Smart MFDs in sizes 9"x12" and 6"x8" for future star platforms.

Multifunction Indicators – 3ATI & 4ATI: The 3ATI and 4ATI display unit features a high-resolution AMLCD and ARINC 429 and discrete interface. The unit is designed to replace existing electro-mechanical instruments, allowing a single



PUNEET KAURA, EXECUTIVE DIRECTOR, SAMTEL AVIONICS & DEFENCE SYSTEMS

part no. to display attitude, airspeed, and altitude. The 3ATI & 4ATI Display Unit consumes little power, is low in weight and high in reliability. The unit is designed for commercial or military installations and an NVIS compatible version is available. The 3ATI & 4ATI display unit is ideal for new build or retrofit applications.

Rugged Displays: To cater to the vast and growing requirement for indigenous rugged displays for land, naval and airborne requirements for our defence forces, Samtel is ready with its vast range of Rugged Displays. RSD series of ruggedised AMLCD displays specifically crafted to cope with adverse and demanding environmental conditions at the same time maintaining extremely high levels of performance. Following sizes of Rugged displays are being showcased: 20.1" Airborne and 20.1" Ground/land-based applications, 19.0", 17.3", 17.0", 15.0", 10.4" with Bezel keys and 10.4" with touch screen.

Electro Luminescent Displays: Cockpit panel flood light and integrally lit cockpit panel are also being showcased at the booth and both provide the aircraft pilot the visibility of the various legends on cockpit instruments, LH & RH consoles in the cockpit while flying at night. •

Russians Are Coming!

The Russian Knights, an aerobatic demonstration team of the Russian Air Force, are here to excite the crowds with their amazing acrobatics. Originally formed on April 5, 1991, at the Kubinka Air Base as a team of six Sukhoi Su-27s, the team was the first to perform outside the Soviet Union in September 1991 when they toured the United Kingdom. The team now performs with four Su-27Ps and two Su-27UBs fighters for their demonstrations but this is not always the case. The Russian Knights aircraft do not use smoke generators.

The pilots and ground crew on the team are variable but don't usually have to practise extensively like other aerobatic teams to change their members for some period. All team members are drawn from the 237th Guards Proskurov Aircraft Demonstration Centre based in Kubinka Air Base, near Moscow. The pilots permanent duty is fighter training and they routinely perform formation training only days before an air show.

On August 16, 2009 two of the Russian Knights aircrafts crashed, killing team leader, 45-year-old Colonel Igor Tkachenko. The two Russian Knights -- Su-27 and Su-27UB -- collided in mid-air during practice flight in preparation for the MAKS 09 air show. Last evidence indicated, that left wingman Col. Vitaly Melnik, flying on Su-27 board number 14, flew through the nose of leader's Su-27UB, while the team assembled after a break manoeuvre. •





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Ahead of fire demo, Tejas breezes through icy test



BY SP'S SPECIAL CORRESPONDENT

Ahead of the Iron Fist fire power demonstration in Rajasthan shortly where the LCA Tejas will be seen breathing fire for the first time as part of a cooperative exercise with other aircraft in IAF inventory, the LCA Tejas has just passed a round of winter trials at Leh. According to the Aeronautical Development Agency (ADA), "Tejas operated from Leh in the winter of 2013, altitude 3,500 m (11,500 ft). The temperature was often down to -15 degree celsius at night and the day temperature rarely exceeded zero degree celsius. The views are spectacular, Leh is the highest commercial airport in the world."

The LCA conducted its first round of winter trials in 2008 at Leh when it proved its high-altitude take-off capability with combat loads. Sources indicate that confidence in the platform has peaked following its performance at Leh and earlier last year during weapons trials in Pokhran.

The LCA Tejas will be performing at Aero India 2013, which its makers hope will be the final Bangalore show before the Tejas sports squadron livery and colours with the Indian Air Force. The first squadron of Tejas fighters is expected to operate from the Sullur Air Force base in Tamil Nadu •

Hawker Beechcraft Names Ted Farid Vice President of Sales for India, Asia Pacific and Helicopter

Hawker Beechcraft Corporation (HBC) has announced the appointment of Ted Farid as Vice President of Sales for the Asia-Pacific (APAC) region, which includes all of North and South Asia and India. In this role, Farid oversees sales activities in a region that is essential to the company's future success, with many of the countries in the APAC region featuring some of the world's fastest growing economies and infrastructures. Todd Hattaway, current director of sales for HBC in India, will report to Farid.

Farid, who was born in New Delhi, India, joined HBC in 1996. He has served in a variety of leadership roles with the company focusing on the Indian marketplace. Most recently, he served as Senior Vice President for International Sales and New Business Development. Prior to HBC, he held leadership positions in international sales and marketing at both Bombardier Learjet and Cessna Aircraft Company.

Farid's extensive worldwide sales experience, especially in the APAC/Indian market places, makes him an excellent choice to lead the company's efforts in this region. He received a bachelor's degree in engineering from Northrop Institute of Technology in Inglewood, California, and is a private pilot.

The former Vice President of the APAC region, Dan Keady, was recently appointed to serve as Senior Vice President of the company's Special Missions organisation.

Hawker Beechcraft Corporation is a world-leading manufacturer of business, special mission, light attack and trainer aircraft – designing, marketing and supporting aviation products and services for businesses, governments and individuals worldwide. The company's headquarters and facilities are located in Wichita, Kansas, with operations in Little Rock, Arkansas; Chester, England, UK; and Chihuahua, Mexico. The company leads the industry with a global network of more than 90 factory-owned and authorised service centres. •

Extended Range for Javelin

The Raytheon and Lockheed Martin Javelin joint venture demonstrated the ability of the Javelin missile to engage targets beyond its current maximum range requirements during a series of tests at Eglin Air Force Base, USA. During the US Army tests, the Javelin system acquired and engaged targets up to 4,750 metres.

These tests prove that, under favorable conditions, Javelin can have reliable, solid performance as a close-combat weapon system well beyond the current maximum range requirement of 2,500 metres, said Duane Gooden, Javelin Joint Venture President and Raytheon Javelin Program Director. There were two direct hits on the threat representative target at the extended range.

Demonstrating Javelin's extended range performance will further enhance survivability of the dismounted Javelin gunner in combat.

Most vehicle requirements are for a missile that can engage a target at 4,000-plus metres, said Barry James, Javelin Joint Venture Vice President and Javelin Program Director in Lockheed Martin's Missiles and Fire Control business. The results of these tests indicate the fire-and-forget Javelin missile can potentially be used in both vehicle and dismounted roles.



According to Brad Barnard, Senior Manager, Raytheon Missile Systems, "We are well poised to meet the Indian ATGM requirements in their whole modernisation programme."

Javelin is the world's most versatile and lethal one-man-portable, anti-tank, guided munition and surveillance weapon system. It is made by the Javelin Joint Venture, a partnership between Raytheon Company and Lockheed Martin. Javelin has been adopted by international armed forces around the world. It is currently fielded with the US Army and US Marine Corps and has also been approved for foreign military sales to 12 nations. •

Honeywell Signs \$2.8 Billion Contract with Embraer

Honeywell and Embraer have signed an agreement worth \$2.8 billion over its lifetime to provide Honeywell's Primus Epic as the integrated avionics system for Embraer's new second generation of the E-Jet aircraft family. Primus Epic integrates these systems into a compact offering and adds innovative technologies such as synthetic vision and advanced flight management for better situational awareness and more fuel-efficient, direct approaches at airports.



The second generation of Embraer E-Jets equipped with Honeywell's Primus Epic is planned to enter service in 2018, with the programme expected to launch later this year. With nine million flight hours to date on E-Jets, Honeywell's highly successful Primus Epic boasts commonality with the current generation of fielded aircraft, allowing for a smooth transition to the new platform.

John Bolton, President, Air Transport & Regional, Honeywell Aerospace, said Honeywell's Primus Epic is an incredibly innovative, highly integrated and proven technology that makes flying safer and more efficient. "Our avionics systems are found inside the world's most successful aircraft, including Embraer's existing 170/190 E-Jet family of aircraft."

Paulo Caesar Silva, President and CEO, Embraer Commercial Aviation, said, "Honeywell has been a valued partner of Embraer for many years, so it is with great confidence that we extend our relationship for this important programme. We believe that the evolution of the Honeywell Primus Epic, including large landscape displays, will provide flexibility for continuous innovation in the flight deck, while offering a mature system and a smooth transition for pilots between the current and future generation of E-Jets." •



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