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EDITORIAL



Aero India is here again.
The ninth edition of Aero India Airshow & Exhibition from February 6th offers an excellent platform to showcase capabilities of Indian companies to the world and grow through partnerships. Similarly, it will also provide an opportunity for Overseas industries to become more aware of Indian Industry & R&D capabilities and develop sustainable supply chains and long term strategic partnerships.

India continues to be one of the promising aerospace and defense (A&D) markets in the world. A number of Indian companies are now suppliers to several international OEMs directly or through their Tier one suppliers. This goes to show the development and quality which our industry has achieved in recent years. In addition to the large PSUs and Private Industries, many of the Indian MSMEs are performing extremely well in the aerospace & defense manufacturing sector.

The global defense industry can take advantage of the promising Indian Aerospace & Defense market by partnering with Indian industries. I suggest a two mutually complementary and sustainable approach for this partnership.

Global aerospace industries must, leverage on the offset package and form JVC with Indian DPSUs, PSUs and large Private Industries. Global Aerospace industries must link their tier one suppliers directly with Indian SMEs to form partnership of mutual advantage and become suppliers to their Indian JVs and to their overseas operations.

SIATI and Aeromag Asia wish participating companies and delegates all success.

Warmly,

Dr CG Krishnadas Nair
Honorary President, SIATI

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Dr. Saraswat takes DRDO
to greater heights, India's
self-reliance in defence
zooming



Antony to create a record of sorts at Aero India 2013



Defence Minister A K Antony is creating a record of sorts at Aero India 2013. It's the fourth time he is inaugurating the mega show as Defence Minister, after doing the honours in 2007, 2009 and 2011 editions.

Antony is keen that the industry should spend more on research and development. He called upon the Indian Industry belonging to both public and private sectors to forsake their "miserly attitude" towards spending on R & D.

"The Government has been keen to encourage the industry to realign its business processes for strategic alliances and joint ventures. The government is also encouraging the industry to step up the R&D efforts to remain globally competitive, especially in critical technology areas", he said.

The Indian industry is at the threshold of becoming a global player in the field of information and communication technology, engineering and manufacturing.

The introduction of Buy and Make (Indian category) is a significant step that has been designed to enhance indigenisation with the opening up of the defence sector in India to 100 per cent Indian private sector in participation with foreign direct investment permissible up to 26 per cent.

Antony hoped that the industry will gradually assume the role of system integrator and manufacturer of complete defence equipment and systems. "This provides a major shift in the role of private sector in India", he said.

The Defence Minister said MoD is in the process of revising the Defence Procurement Procedure (DPP) and the revised DPP will be operational from the next financial year. Describing offsets as an integrated part of India's policy to promote indigenisation, he said the policy has enabled greater participation of the defence industry in the country.

The revised offset guidelines which came into effect from August last year include multipliers to incentivise investment in MSME and facilitate technology acquisition. The need to strengthen the monitoring mechanism for the implementation of offsets has been addressed by establishing of the Defence Offset Monitoring Wing under the Defence Acquisition Council.

"I hope that offset as mechanism will be fully utilised by the private industry in conjunction with the foreign collaborations, towards armament indigenisation and manufacturing", the Minister added.

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Dr. Saraswat takes DRDO to greater heights, India's self-reliance in defence zooming



Dr Vijay Kumar Saraswat



Dr Vijay Kumar Saraswat is a man of action. He started his career in DRDO in 1972, and as Project Director, he steered the design, development, production and induction of first indigenous surface-to-surface missile system Prithvi into the Armed Forces. The successful testing of missile on-board a moving ship with very Dhanush high terminal accuracy brought new dimensions in the national defence scenario.

Under the able leadership of Dr Saraswat, India has embarked on a challenging, futuristic Air Defence Programme encompassing development of complex anti-ballistic missile systems, radars, C4I systems and integration of battle management resources into a national authority. As Programme Director, he has spearheaded the concept of theatre defence systems and integration of national Air Defence elements. As Director, Research Centre Imarat, Hyderabad, he conceptualised and established facilities for development of Micro and Nano Sensors for future avionics.

In an exclusive interview to Aeromag Asia on the eve of Aero India 2013, Dr. Saraswat, Scientific Advisor to Defence Minister, Secretary Defence (R&D) and DRDO Director General, sounded upbeat about DRDO prospects going forward.

"We have successfully flight-tested under water Missile B05, developed by us on 27 Jan 2013 from Bay of Bengal off the coast of Visakhapatnam", he said. "The Missile launched from a pontoon, was tested for the full range and met all the mission objectives. All the parameters of the vehicle were monitored by the Radar all through the trajectory and terminal events have taken

place



exactly as expected".

He spoke excitedly about the Agni programme. Agni 5, India's state of the art long range ballistic missile termed as "the game changer", was the star attraction in DRDO contingent in the Republic Day Parade this year.

Saraswat said Airborne Early Warning and Control (AEW&C) System, India's Indigenous system with all weather, all terrain, all environment capable surveillance system is the simplest, most cost effective airborne early warning system in its class. This system is indigenously designed and developed keeping current and future operational requirements of IAF in the view.

The system is mounted on an Embraer Aircraft of Brazil which has been extensively modified for installation of DRDO developed Mission System, such as active array Radar system, identification of friend or foe system and several other sensors. A mission computer on board focuses the information from all the sensors and presents it to several operators simultaneously.

"DRDO remains committed to make India strong and self-reliant. DRDO has led to the design, development and productionisation of world class weapon systems, equipment, and complex technologies associated with such systems. The production value of

systems (excluding the strategic systems) based on technologies developed by DRDO (inducted/accepted/orders placed) during the past one decade is well over Rs 1,50,000 crore. Today, over 55% of the requirements for our defence forces are being met indigenously, largely with the technologies developed by DRDO, besides range of spin-offs for societal benefits, contributing greatly to our nation's economy as well as civil society.

AWACS

DRDO has just taken up development of the Airborne Warning and Control System (AWACS) that will have the capability to penetrate "longer distances" in enemy territory by way of radars and electronic warfare systems without venturing into the region physically, Dr. Saraswat said.

"AWACS is a heavier and high endurance system, which can give you in terms of coverage about 360 degrees as against AEW&C which is about 270 degree coverage".

In addition, compared to AEW&C, AWACS flies at a higher altitude and it can penetrate into the enemy territory - not physically - (but) by way of radars and EW (electronic warfare) systems to longer distances and it can be in sky for larger durations, besides giving better visibility.

"Both have a role. All over the world, people have AEW&C and AWACS in a tandem mode because each one does its role and that's what our country is also doing", Dr. Saraswat said.

Dr. Saraswat also said that the DRDO has conducted a flight of "guided bomb". "It's a bomb which can fly for about 40-50 or even more kilometres in a guided mode and it can be released from an aircraft".



He said the guided bomb is a totally indigenous effort, from designing, development and realisation including explosive content in them, as also guidance and control.

Nirbhay

Flight test of sub-sonic, medium range cruise missile Nirbhay, is slated for February 2013 next month, Dr. Saraswat said.

Nirbhay is being developed by Bangalore-based Aeronautical Development Establishment (ADE), a DRDO lab.

"This is in the final stage of integration and we expect to launch it in February," Dr. Saraswat, adding, Nirbhay has good loitering capability, good control and guidance, high degree of accuracy in terms of impact and very good stealth features.

Self reliance is the buzz word

"Independence of control is our buzz word for self reliance. To that extent I can say DRDO has done exceedingly well because while we used to depend on imports of majority of our systems in the 1980s, today our import content is purely on electronic components and some sensors which are not cost effective to produce in this country. For example, if you take in the case of missile today, we are only importing electronic chips, we are importing may be some of the sensors, otherwise all materials, all subsistence, all modules for doing the integration of the missiles are indigenous", Dr. Saraswat said.

Design technology, design capability, testing capability and all related infrastructure have been very well set up

in this country. "I would like to say overall if you look at all disciplines of DRDO whether it is aeronautics, or electronics or computers or Naval system or missile systems or materials on an average, our self-reliance index was used to be 30 per cent in 1990s. It's almost about 55% today. This analysis has been done by excellent agencies, who are working with us, who have a very good hold on the evaluation of the economic performance of various departments and they also looked at the return on investments".

While imports will continue to meet the immediate requirement of the armed forces, indications are that very clear that our services would take more and more systems based on India R&D and Indian Defence production.

"If you look at our portfolio, we are working on some of the cutting edge technologies. In all our UAV programmes, we will employ best of the technology in composite, the power plants, the sensors and also the command controls and autonomy for the system", Dr. Saraswat noted.

"Our LCA itself is 4th plus generation aircraft, with its unique features – configuration, composite structures, glass cockpit, integrated avionics and health monitoring systems. If you take all these parameters, it makes a state of the art aircraft, that is why we call it as the 4th plus generation, we don't call it as 4th generation".

"The next generation of the aircraft that we are building now is Advance Medium Combat Aircraft. It will have practically everything available in today's world as far

as aeronautics is concerned"

"You take for example our Solar systems, which DRDO is developing. In fact today Indian Navy does not import any solar, it is purely DRDO which is providing the solar capability for our ship and sub-marine", he explained.

"You take our electronics warfare system. While we are collaborating with some of the agencies purely to accelerate our programmes, the technology is mostly indigenous. The complete altitude and aptitude test designed by our own DRDO which is being practiced by all the Service Selection Board for Army and Air Force. We look after the soldiers at high altitude for their clothing, for their survival and high altitude in cold condition and also for the foot requirements. We have a laboratory which produces the vegetables and the fruits for consumption by our armed forces. Once upon a time the entire load which was needed by our armed forces deployed in the high altitude, were used to be imported and used to be transported from Delhi and Chandigarh which used to cost a lot of money.

Today, more than 70 per cent requirement is met indigenously i.e, locally, and not only have we trained local farmers and the army units for producing these vegetables and fruits, but as a result today, this self reliance has come in a big way".

"We are also having a programme whereby we are going to work with the Department of our Rural Development and more than 1000 panchayats will be supplied with these bio-digesters", Dr. Saraswat concluded.



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LCA-Tejas

Sky is not the limit

Light Combat Aircraft-Tejas is India's dream project meant to boost the indigenous aerospace capabilities. It has emerged as an epochal product that the nation can be proud of.

The value of the aerospace "self-reliance" initiative was not simply the production of an aircraft, but also the building of a local industry capable of creating state-of-the-art products with commercial spin-offs for a global market. The LCA programme was intended in part to further expand and advance India's indigenous aerospace capabilities.

There has been delay in the manufacturing of LCA-Tejas. The Initial Operational Clearance-1 (IOC-1) for the Tejas has been achieved on the 10th January, 2011. It was the first time an indigenously designed and developed military fighter aircraft was certified for Air Force operations. Presently, LCA development activities leading to final operational clearance are in progress.

The deliveries of aircraft are scheduled in the 12th plan period. It is planned to induct six LCA squadrons by the end of 13th Plan. As on January 12, 2013, LCA-

Tejas has successfully completed 1977 test flights.

Early years

In the early eighties, it was realised that no organisation existed which had the total capability to develop such an aircraft all on its own. The last time an indigenous fighter aircraft, the HF 24 flew was in 1961. Since then, the HF 24 assembly line had been shut down and the design team had been wound up. The only way left was to develop an aircraft from scratch.

To better accomplish these goals, the government of India in 1984 decided to establish the Aeronautical Development Agency (ADA) to manage the LCA programme. Hindustan Aeronautics Limited, (HAL) was to be the principal partner with participation of various DRDO & CSIR Laboratories, Public & private sector industries and academic institutions.

Tejas Programme had been initiated nearly three decades ago to develop the technologies of the fourth generation fighter aircraft and demonstrate them on two technology demonstrator aircraft.

There was a gap of two generations of technologies at that time.

The challenge was taken up and the first Technology Demonstrator encompassing fourth generation fighter aircraft technologies was flown on January 4, 2001. By March 2004, with one more Technology Demonstrator and one Prototype vehicle, all the technologies of the fourth generation relevant to the Tejas had been demonstrated successfully, completing the technology demonstration phase.

It is worth recognising that during the last two decades; the effort of the Tejas team has not only gone into production of the aircraft and the flight testing, it has uplifted the technology level of various disciplines of design, development, ground testing and flight testing in the country. Technology levels of these areas have been taken up to fourth generation in the country. The Programme has also nurtured a large human capital of Aeronautical Engineers during the last two decades. This evolution of the eco systems in Aeronautics has made the country ready to take on future military



and civil aviation challenges.

Tejas Mark-I is planned at present for 40 aircraft only. Tejas Mark-II aircraft is under development with an alternate higher powered engine with considerable improvements. Final cost assessment will be available only after the development phase of Mark II is completed. Scope for cost reduction of Tejas Mk-I has been examined and the same is assessed as not feasible in view of limited quantities.

LCA -- christened 'Tejas' by then Prime Minister Atal Bihari Vajpayee at a ceremony held at Bangalore on May 4, 2003 -- surely has taken a long time from the drawing board to what it's today. Sceptics had written off the project many times over. The doubters thought it made better sense to import a similar aircraft, even though under existing technology denial regimes India would have to settle for less sophisticated models.

Re-inventing the wheel

India's scientists and engineers had to re-invent the wheel in many areas, but they have designed, tested and produced a world-class machine, which the country's Air Force can fly with pride and confidence.

Tejas has tailless, compound delta configuration with size and weight advantage and better close combat, high speed and high angle-of-attack characteristics. The longitudinal stability is relaxed to enhance agility, manoeuvrability and performance. To

improve high speed handling and reduce wave drag, the wing is optimised with camber & twist, wing body blending and area ruled fuselage.

Tejas has an Airframe designed for strength and stiffness under specified loads in extreme environment with durability and damage tolerance.

Tejas incorporates a highly reliable quadruplex digital fly-by-wire Flight Control System. The new generation glass cockpit comprises Multi Function Displays (MFD), Head Up Display (HUD) and Stand by Instrumentation System driven by Open Architecture Mission and Display Computer.

Any modern fighter is only as good as the weapons she can deliver on target. The Tejas is designed to carry a veritable plethora of air to air, air to surface, precision guided and standoff weaponry. In the air to air arena, the Tejas carries long range beyond visual range weapons, with highly agile high off-bore sight missiles to tackle any close combat threat.

Tejas is equipped with a quadruplex digital fly-by-wire flight control system to ease handling by the pilot. The digital FBW system of the Tejas employs a powerful digital flight control computer (DFCC) comprising four computing channels, each with its own independent power supply and all housed in a single LRU.

Tejas is intentionally made longitudinally unstable to enhance manoeuvrability. The Control laws (CLAW) recover Stability and provide good Handling Qualities to

the Pilot.

The autopilot provides pilot relief functions. This helps the pilot to do more head down activities (especially mission critical activities) without being concerned about the aircraft departing from its flight path.

The Tejas employs CFC materials for up to 45 per cent of its airframe, including in the fuselage (doors and skins), wings (skin, spars and ribs), elevons, tailfin, rudder, air brakes and landing gear doors. Composites are used to make an aircraft both lighter and stronger at the same time compared to an all-metal design, and the LCA's percentage employment of CFCs is one of the highest among contemporary aircraft of its class

The use of composites in the LCA resulted in a 40 per cent reduction in the total number of parts compared to using a metallic frame

The term Glass Cockpit refers to a modern cockpit in which all the round dialed electro-mechanical instruments have been replaced with Multi-Function Displays (MFDs) and a Head Up Display (HUD). A glass cockpit uses several displays driven by flight management systems, which can be adjusted to display flight information as needed. This simplifies aircraft operation and navigation and allows pilots to focus only on the most pertinent information.

The Tejas is a tailless, compound delta platform. This platform is designed to keep the Tejas small and lightweight. The use of this platform also minimises the control surfaces needed (no tail planes or fore planes, just a single vertical tailfin), permits carriage of a wider range of external stores, and confers better close-combat, high-speed, and high-alpha performance characteristics than conventional wing designs.

The coherent pulse-Doppler Multi Mode Radar is designed to operate equally effectively in the Air to Air and Air to Surface domains. Jointly developed as an Indian - Israeli venture, it features multi-target Air to Air Track, Hi Resolution Synthetic Aperture Mapping and specialized Air to Sea modes.

Open Architecture Computer (OAC) designed and developed by ADA, combines the functions of earlier mission computer, display processor, video switching unit and mission preparation and retrieval unit.

Real time simulator, Hardware-in-Loop (Iron Bird) Simulator, Engineer-in-Loop simulator Systems Development

and Evaluation Facility are some of the facilities that enable the pilot an exhaustive and confidence building testing and evaluation of all systems of the aircraft before flying the Tejas.

The Tejas is a pilot's aeroplane and nowhere is this more evident than in her handling qualities and performance characteristics. She rockets off the runway and into the air in a mere 500 metres, and her control harmony and carefree handling characteristics are clearly demonstrated in the almost poetic ballet in the air that is the aerobatic display routine.

Tejas development programme has also accomplished the design and development of two -seater trainer aircraft for Indian Air Force (PV-5). Being a fully operational trainer this prototype is also obtaining the full operational clearance.

LCA-Navy

The success of Tejas programme for IAF drew the confidence of Indian Navy entrusting ADA with the Design and Development of Naval Version of LCA for operation from Aircraft Carriers. Aerodynamic fixes to improve low speed performance for Carrier Operation, addition of Arrestor Hook for deck recovery, need for a stronger Undercarriage and Cockpit redesign for naval operations have made the LCA Navy development programme an immense challenge.

World class infrastructure facilities created through the LCA programme have significantly increased the level of technical competence in the country, thereby giving the confidence to take up more complex fighter aircraft developments activities in the future. ADA has taken up the Design and Development of next generation fighter-Advanced Medium Combat Aircraft (AMCA). Technological capabilities acquired through LCA programme enabled ADA to participate in the development of 5th generation Combat Aircraft.

Spin-off benefits Indigenous technology development initiative of 'Tejas' Programme has potential spin-off benefits to other aircraft development Programme and to support aircraft operating in Defence Service.

Tejas has re-scripted the history of Indian Aeronautics in golden letters. Success story of Tejas is an epitome of corporate collaboration involving R&D laboratories of DRDO, CSIR, CEMILAC, DGAQA, Defence PSUs like HAL and BEL, among others,, Private sector participants and prominent



educational institutions, all coordinated by nodal organisation ADA.

Tejas rejuvenated the field of Aeronautics in India with capabilities of Research, Design & Development, Fabrication, Assembly, Testing facilities, Air worthiness Certification and Quality Assurance undergoing a radical upgrade. The sheer elegance and dignity with which it zooms to skies and accomplishes the mission with surgical precision is a privilege to watch. It is the ultimate dream machine of a patriotic pilot who wants to score honours for his country.

LCA is the smallest lightweight multi-role supersonic aircraft in the world. With state-of-the-art technologies in every aspect of design and development, this single seat, single engine tactical fighter from India is among the best in the world in its class.

The mission of LCA programme is to design and develop a world class fighter for Indian Air Force to replace MiG series of aircraft and to create the technology base in the country for such a development. For Survival in today's battlefield, agility and manoeuvrability are crucial. The use of advanced aerodynamic, structural, avionics and control systems has given LCA all weather, day/night capability with excellent mission and point performance. LCA's emergence has led to the development in state-of-the-art materials, manufacturing processes, computational and test facilities at the national level, taking the country to technological self-reliance.

Tejas is fitted with advanced sensors like Multi Mode Radar (MMR) Litening Pod (Day and Night imaging sensors). These when integrated with the on board weapon system, makes it a potent multi role combat aircraft.

ADA has developed a number of software packages in the areas of CAD, CAM, CAE, VR, CFD, and composites. A number of real time software for onboard application in the areas of Avionics, IFCS, Mission computer and software tools for Independent Verification & Validation (IV & V) have also been developed at ADA. All these packages have been extensively used for LCA and a few of them marketed within India and abroad.

Dream of the country's first indigenous effort to build a carrier borne Naval Fighter aircraft got a fillip with the crossing of another significant milestone of the first Engine Ground Run (EGR) in Bangalore on September 26, 2011 of first LCA (Navy) prototype NP1.

LCA Navy maiden flight

The LCA Navy NP1 made its maiden flight in Bangalore on April 27, 2012, when Commodore J A Maolankar, Test Pilot and Wg Cdr Prabhu, Flight Test Engineer completed a 22 minutes flight. During the flight the aircraft was put through various manoeuvres including low speed handling and even undertook a close formation flying at slow speed with another aircraft.

With this India has crossed a major milestone in Design, Development, Manufacturing and Testing of a "four plus" generation Carrier Borne Fly-by-Wire STOBAR aircraft.

LCA Navy is the second STOBAR (Ski Take Off But Arrested Recovery) Carrier Borne aircraft in the world, after the Russian deck based aircraft. However, this will be the only Carrier borne Fighter aircraft in the Light category.



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Tejas is very close to getting IOC for LCA-Tejas, says Shri PS Subramanyam Director, ADA in this interview to Aeromag Asia.

TEJAS Programme is dashing towards the completion of IOC: Subramanyam

What's the update on the LCA Tejas programme?

We are very close to the IOC clearance and we have already completed around 2000 flights. There is an order for 20 aircraft in the IOC configuration and another for 20 more aircraft in FOC configuration.

Even though we have creditable achievements, there are a few design improvements which we are preparing and these improvements will lead us to IOC standard.

Could you share your thoughts on the roadmap for the LCA-Tejas programme and the milestones you are looking going forward to?

After the IOC clearance, we are going to work towards FOC in which we will envisage the flight envelope of the aircraft from the 22 degree of angular attack to 24 degree of attack and the maneuvering of the aircraft from 6 g to 8 g. Also we will integrate new missiles. For FOC we have to achieve the in-flight refueling, which will give extended flying hours.

And towards FOC target realisation we are integrating a 23 mm gun and also some other conventional weapons indicated by the Air Force.

So before the FOC completion, all these activities are achievable. By 2014 December we will achieve full FOC reaching all objectives and that will see 20 Aircraft ordered by IAF.

We hope that within about five years, the 40 aircraft ordered by IAF 20 in the IOC configuration and 20 in the FOC clearance configuration can be delivered. And



during this process, some refinement of the software and some of the hardware if necessary will also be done.

What are the advancements on the LCA Tejas Navy?

Tejas Naval Aircraft was flown last April, we got feedback from the flights and on the basis of this, further design improvements are going on and by February 2013, the Aircraft will be back for flight test. We are

targeting a very important technology event in the first half of this year, where the Tejas Naval Aircraft will do the ski-jump from the Shore Based Test Facility in Goa. This will be a unique achievement, when the Aircraft goes over the ramp of angle 14 degree and does ski-jump. Very few countries in the world have this capability.

In the Shore Based Test Facility for the Tejas Naval variant, the team is working for the operation of Arrestor hook and arrestor

gear which is very similar to the deck of an aircraft carrier.

While landing on the deck, the arrestor hook latches on to the arresting gear and the Aircraft will come to a stop within a short distance and also high deceleration.

The part of arresting gear, the arresting wires are also created at the shore-based facility. The test will continue in the Goa facility till the Aircraft carrier is available.

The shore-based test facility in Goa has



Defence Minister A.K.Antony visiting ADA stall at Aero India 2011. ADA Director Shri P.S.Subramanyam, ADA Technology Director (GS) Shri R.Swaminathan, Secretary Defence Production Shri R.K.Singh, Dr.Prahlada, Scientific Advisor and DRDO Director General Dr.V.K.Saraswat, Union Minister Dr.M.M.Pallam Raju, Air Chief Marshal P.V.Naik, Defence Secretary Shri Pradeep Kumar, LCA Navy Project Director Shri C.D.Balaji also seen.



and software practices. This also envisages active electronically scanned array radar (AESA) and also principles of shared aperture and special radomes with features of frequency selective suppression. At present the conceptual design is in final phase and will be completed in the first half of this year.

Could you share new initiatives of ADA?

ADA has taken up the technology and growth of the country as a very important aspect and is trying to evolve in the areas of design, simulation, analysis, testing facility to catch up with the rest of the world. High power computer facilities model based system definition, model based system engineering specially applied to electro-mechanical systems is the major thrust. ADA also has taken up the human resources as major challenge and recruiting new scientists through various induction schemes and also launching programmes for improving the skill of scientists and staff in respective areas with supplementing with various training programmes within the organisation and outside organisation.

Share your thoughts on Aero India 2013, and the capabilities that ADA is going to showcase in this mega Bangalore event?

Aero India 2013 is the platform where ADA would showcase the various disciplines like: CFD capabilities, Aero Dynamics, the capabilities of design and development of complex composites structures, Structural Analysis by Structural team. The products developed by the general systems directorate in terms of various electro-mechanical systems will also be displayed. The avionics system directorate will display the products and capabilities of design, development, testing and certification. A ground based stimulator will be a special attraction for the public. The product support directorate will be showing the capability of the aircraft, flight control, maintenance and simulators. The flight control system directorate will display capability of indigenous product development and system engineering capabilities of integrated flight control system.

ADA will also demonstrate the capability of its aircraft through a series of aerobatic flying demonstration by Tejas aircraft.

A 1:1 mockup model of the LCA trainer would also be put up on display for general public. Thus, ADA targets to display capabilities and products that it has acquired and developed over a period of two decades and also display the profiles of future programmers like AMCA.

all features of a typical Aircraft carrier like Vikramaditya including landing and take-off facilities.

The second Aircraft is also getting ready and it will fly this year.

It is heartening to say that Indian Navy is considering a requirement of 8 Naval Aircraft as Limited Series Production to put the programme in the fast track for flight test and evaluation of the fighter variant.

In both LCA Air Force and Navy, our team is eagerly working for the MK II variants. The MK II variant will be equipped with high power engine, on board oxygen generating system. This aircraft will take care of all aspects of maintenance-related issues from MK I. The technologies of various subsystems like fuel system, hydraulic system and ECS system, brake system will have current technology with respect to the rest of the world. And the Avionics system will undergo a major change in terms of more comfortable pilot vehicle interface system and upgrade of Avionics systems hardware.

The flight control system of MK II will have an upgrade of digital flight control

computer with major modifications and some other major modifications.

Both Naval and Air Force variant of MK II would be contemporary when they get into production by the end of this decade.

Both Air Force and Navy have given indication of five squadrons of Air Force variant and 40+ aircraft of naval variant, and the programmes are going towards achieving the objectives of MK II requirements.

Could you throw light on the advanced medium combat aircraft programme?

ADA is working on feasibility studies and conceptual design of Advanced Medium Combat Aircraft whose main objective is to provide 5th generation Medium Combat Aircraft with emphasis on the 5th generations technologies like:- Stealth, super cruise, Super maneuverability, advanced avionics systems with concepts of Net-centric warfare and pilot associate based software to assist the decision making of the pilots. All the electronics will be state-of-the-art in terms of communication networking, processors

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Discover more

LCA-Navy

can be a replacement for Sea Harrier: Balaji



C D Balaji
Project Director

The LCA Navy programme was started in 2003 March with 40 per cent funding from Navy.

A confident Project Director C D Balaji said: "We are slightly ahead of the schedule and LCA Navy can be a replacement for Sea Harrier in future. Navy is closely monitoring the project and the government wanted to make this project as a success. So we have to make this as a success".

Unlike the IOC for the Air Force variant, the main focus for the Naval LCA is the Carrier compatibility demonstration and IOC capability.

The significant challenge is that the Aircraft has to take off from a 200 metre small runway and during landing it has to stop within a distance of 90 metres using arrestor hook.

"The Shore based test facility at the Goa Naval base will be ready by the middle of this year and we have recreated an Aircraft carrier with all test facilities by using 800 tonnes of steel", he said.

"Unlike the Air Force version, the Naval Aircraft is a new experiment in India since we don't have any past experience. Now everything is on schedule and the test will be conducted before December this year, the approved schedule from the government".

Background

Post the successful flight of the Air Force Technology Demonstrator TD1 in the year 2001, LCA Navy variant was conceived and approved by the Government in March 2003 as replacement for the Sea Harrier fleet Operating from INS Viraat. LCA Navy was envisaged to operate from the indigenous Aircraft Carrier (IAC), with a 14 Deg ramp and arrested landing capability.

The complete Full Scale Engineering Development of the Naval version of LCA (FSED Navy) was divided into two main phases.

a. FSED Navy Ph-1:

- I. Design and development of 2 Aircraft (1 fighter and 1 Trainer)
- II. Structural Test Specimen (LEVCON), stub wing & Air intake)
- III. Shore Based Test Facility (SBTF)
- IV. Build of an additional Trainer (NP5) within resources.

b. FSED Navy ph-2:

- I. Design and Development of 2 fighters in Mk2 configuration with higher thrust engine.
- II. Structural Test Specimen in Mk2 configuration

Present Status

The first Naval LCA Navy prototype, the NP1 had its maiden flight on 27th April 12, post which initial flight testing was completed, covering various critical test points which were required to refine the simulation models used during the initial design and development. This would be applied to other prototypes NP2 and NP5 as improvements during the development. NP1 has also carried out undercarriage retraction, which has given the design team a fair idea on the performance capabilities of the aircraft in an operational scenario. Presently, the aircraft is undergoing modifications and tests which are mandatory for its Ski jump launch at the Naval Air Station at Goa. The second prototype being a fighter version NP2 is presently undergoing equipping after successful completion of fuselage structural coupling. The aircraft has incorporated lessons learnt from NP1 testing and first set of flights as well as from the ongoing flight tests of the LCA AF versions.

A Shore Based Test Facility (SBTF) replicating an aircraft carrier with ski-jump take-off and arrested recovery is being set up at the Naval Air station in Goa. The take off area of the SBTF is ready. The landing area is scheduled to be completed by mid 2013.

Post successful launch of the first Naval prototype the NP1, Indian Navy has indicated interest in Limited Series Production (LSP) of 8 aircraft (4 trainers and 4 fighters) in the Mk1 configuration.

Balaji shared his thoughts with Aeromag Asia

What are the major changes between Airforce and the Naval LCA Versions?

Naval version of LCA is designed with a landing gear and associated structure to cater for a descent rate of 7.1 m/s vis-à-vis 3m/s for the Air force to facilitate arrested recovery on board a carrier. The aircraft has a fuel dump system to bring the aircraft weight to landing condition in case of emergencies before recovery onboard. There is an additional control surface the LEVCON to bring down the landing speed for pilot comfort.

What were the challenges faced during the development of the Naval version?

Development of special materials to cater for high landing loads was the biggest challenge. As an indigenous effort, maraging steel required for Landing gear was developed by MIDHANI, Hyderabad and forged at Bharath Forge, Pune. The development and integration of the LEVCON surface and the arrestor gear was another big challenge as these were areas where there was no expertise in-house. Testing and Qualification of various system components to withstand the shock loads due to arrested landing was another area of challenge. Various test fixtures were specifically designed and developed for qualification of these equipments.

What was the reason for delay in the development of the programme?

The Naval Programme closely followed the Air Force programme. Further, as LCA Navy was the first completely indigenous air element to design and build, development of navy specific equipment and technologies took more time than anticipated due to unforeseen challenges encountered.

What was the requirement of grounding of NP1 post limited flights?

The first Naval prototype was faced with various challenges specially with respect to the fuel system and ECS systems requiring major changes. The aircraft was cleared for limited sorties pending these design changes, as the initial flight test results would give ADA and HAL, ARDC valuable data towards improvements of the overall naval programme (which has happened as expected). Modifications to main landing gear design were carried out post analysis of ground test results. NP1 is presently undergoing all the above changes to meet the ski jump requirement to be undertaken at INS Hansa Goa.

What were the reasons for the delay of NP2 aircraft development?

The second prototype, the NP2, was upgraded to incorporate all major modifications like the lightning protection, rain water proofing, based on developments carried out on the Air Force version and the initial flight testing of NP1. This called for approximately 150 drawings to be changed and upgraded. The fuel and ECS systems of the aircraft was also modified to NP1 latest standards, which required validation on NP1 itself prior incorporation on NP2. The aircraft has also been fitted with RDI communication equipment in place of the original INCOM set resulting in layout changes and considerable wiring change. The improved landing gear is being fully qualified prior fitment on NP2.

What was the reason to build the second Trainer NP5?

The second Trainer prototype NP5 is being built as a risk mitigation factor. The aircraft will be nearer the production standard and will help ADA and HAL ARDC to create production standard drawings for all trainers for the Navy.

What is the state of SBTF progress?

SBTF being built at INS Hansa, Goa, is presently progressing on time meeting all major milestones. The take-off area has been cleared for testing. The landing area will be completely cleared by mid-2013.



Aero India 2013

Let the show begin!

India's growth in aerospace technologies, complemented by its expanding economy, makes Aero India 2013 an ideal platform to nurture and further Aerospace interests.

Department of Defence Production, Ministry of Defence, Government of India is hosting the ninth International Aerospace & Defence Exhibition Aero India 2013 at Air Force Station Yelahanka Bangalore from February six to 10. Defence Exhibition Organisation, MoD, has appointed Federation of Indian Chambers of Commerce and Industry (FICCI) as the Event managers of Aero India 2013.

Aero India is an aviation - linked platform which is instrumental in showcasing India's ability to be in the forefront of technology spectrum, the country's global outlook and its potential as a major market for the aviation industry. It is a perfect forum to promote and showcase aerospace related products to a discerning professional audience. It also provides a world of opportunity to network with aviation industry of national/international repute and benefit from sharing of expertise in the fields of R&D, production and development support with other global players.

The Defence Minister Mr. AK Antony

would inaugurate this biennial event, which provides a significant platform for Indian and Foreign vendors. The five day show aims at promoting products and services being offered by Indian Defence Industry in the International Market and providing exposure to the Armed Forces, R & D personnel to the latest Aviation and Aerospace Industry.

While Aero India 2011 saw the participation of exhibitors from 29 countries with more than 675 companies and 47 overseas delegations accommodated over the gross exhibition area of 75,000 Sqm, the ninth Edition of this International Aerospace Exhibition is expected to see the participation of over 600 companies and 78 overseas delegations accommodated over an approximate area of 1,25,000 Sqm.

The largest overseas participation is seen from the USA with indoor space occupied being 1,185 sqm followed by Israel and Russia. Other major participants are France, the UK, Germany and Belgium, Bulgaria, Italy, Ukraine, Australia, Belarus, Czech Republic, Japan, Norway, South Africa, Spain, Switzerland, Austria, Brazil, Canada, the Netherlands, Romania, Sweden, the UAE and Singapore.

The event would also see the participation of aerobatic teams – Flying

Bulls from Czech Republic, Russian Knights-Russian Air Force Aerobatic Team and IAF's Sarang Aerobatic Team.

The first edition of Aero India was held in December 1996 with an objective to provide significant platform for business opportunities in the International Aviation sector as well as to exhibit capabilities of Indian Defences R & D and Production. Being a biennial event, subsequent editions were held in 1998, 2001, 2003, 2005, 2007, 2009 and 2011. While a modest 176 companies participated in the second edition of Aero India in 1996, the event in its ninth Edition of 2013 is expected to feature over 600 companies.

More than 78 official delegations are expected to attend the four day exhibition with many products expected to be launched by Indian and Foreign Companies during the exhibitions. Several Business to Business meetings are planned to be held on the sidelines.

The main thrust of DRDO - ADA pavilion at Aero India 2013 will be centred around projections of aerospace related R&D advancement made by DRDO labs and the coordinated efforts of various R & D work centres of DRDO. DRDO laboratories are participating and showcasing their technological might in various formats -- indoor and



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outdoor exhibition and static and flying displays.

HAL will showcase its strength in design, development and production will be showcased through its products during the Aero-India 2013. The major attractions of the HAL's pavilion include in-house designs such as Light Combat Helicopter (LCH), "Rudra" the weaponised Advance Light Helicopter (ALH) and Intermediate Jet Trainer (IJT).

"For the first time, we will present to the world glimpses of prospective

multirole fighter (PMF) also known as Fifth Generation Fighter Aircraft (FGFA). This is under co-development with the Russians", says Dr. R.K. Tyagi, Chairman, HAL.

ALH- Dhruv, LCH and Rudra (Mk 4 WSI) will be on flying display. Scale Models of Light Utility Helicopter, Hawk, Light Combat Aircraft (LCA) and Su-30 will also be on display.

In addition, Pilotless Target Aircraft (Lakshya), Shakti engine, state-of-the-art accessories and avionics from various

Divisions of HAL are being showcased.

The other specialties of the HAL pavilion include 3D video mapping of HTT-40, Dornier Glass cockpit, scale models of aerospace structures of GSLV MkII, GSLV Mk III and PSLV. The Rotary Wing Corner will provide the visitors through simulation & visual display, a helicopter view of the technologies, the capabilities and competencies built in the Company. There will also be a holographic projection depicting capabilities of LCA, Hawk, LCH and LUH.

Rosoboronexport at Aero India 2013

Rosoboronexport delegation is to present the latest export models of Russian aviation and air defence equipment and discuss the promising areas in military-technical cooperation between Russia and India and other countries in the Asia-Pacific region.

AERO INDIA 2013 will give a new impetus to strong positive military-technical cooperation between Russia and India and other

countries in the Asia-Pacific region at the AERO INDIA 2013 to be held in Bangalore from February 6 to 10.

Rosoboronexport will present the Yak-130 combat trainer, Il-78MK-90 tanker, the newest Il-76MD-90A military transport aircraft, Be-200 multipurpose amphibian, Mi-35M, Mi-26T2, Ka-31 and Ka-226T helicopters, as well as many other new samples of the Russian aircraft industry, including training aids and airborne weapons.

Russian planes and helicopters have proven to be worthy in the Asia-Pacific region. The fact that India's Republic Day Parade 2012 started with a flyover by the newest Mi-17V-5 military transport helicopters, which were given the honor of carrying the National Flag and the Army, Navy and Air Force flags, was a clear evidence of India's strong confidence in Russian aviation equipment.

Building an anti-aircraft and missile defence system, without which it is impossible to talk about the reliable security of any state, is very promising for the development of a military-technical dialogue with the countries in the region, particularly with India. With its vast experience in this sphere, Russia will showcase a wide range of reliable systems capable of providing assured



protection for military installations, administrative and political centers, and infrastructure components in India – the Antey-2500 ADMS, Tor-M2E and Buk-M2E SAM systems, as well as the Pantsir-S1 SPAAAGM system and Igla-S MANPADS.

Rosoboronexport Deputy Director General Viktor Komardin heading the joint Rostec and Rosoboronexport delegation noted that in cooperation with India Rosoboronexport came over, de facto, from traditional sales pattern to joint development of the latest equipment.



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Innovative, cost-effective and ecologically friendly **Sukhoi Superjet 100**

Despite taking a serious blow in the 1990s, Russia has made an astonishing resurgence in the aerospace industry in recent years. This almost certainly wouldn't have been possible without the abiding trust in and use of innovative technology by Russian aircraft manufacturer Sukhoi. Though its heritage may lie in the military world, in the last decade Sukhoi has turned its attention to the civil sector, with a view to not only tap into but also expand this lucrative market. As part of its renewed focus, in 2000, it founded Sukhoi Civil Aircraft Company (SCAC).

The subsidiary's sole purpose is to concentrate on the commercial aviation business, covering aircraft design and development, production, marketing, sales and support.

In 2007, SCAC in partnership with Italian aviation company AleniaAermacchi (a Finmeccanica company) launched its SukhoiSuperjet 100 (SSJ100) family of aircraft – the first regional passenger airliner in Russian aircraft history. SCAC prides itself on the fact that throughout the history of Russian commercial aviation, SSJ100 appears to be the first aircraft ever designed with due consideration of requirements and demands of potential worldwide operators. To achieve this, the company pulled in the expertise of more than 30 globally recognised system and component suppliers.

The Aircraft

The SSJ100 is a fusion of Russia's famed aviation design and production skills with the latest systems from leading aerospace suppliers around the world –

offers standards of economy, performance, environmental efficiency and passenger comfort never before seen in a 100-seat airliner.

The SSJ100, the only aircraft of its size equipped with a full fly-by-wire system, offers big-jet feel in a compact form that is ideally suited to emerging airline markets and perfect for operators looking to right-size their fleets.

The first Sukhoi Superjet 100 (SSJ100) prototype was rolled out from SCAC's final assembly shop at Komsomolsk-on Amur (Russia) on September 26, 2007. The first flight was successfully accomplished on May 19, 2008.

SSJ100 is a state-of-the-art 100-seat new generation jet – advanced, cost-effective, comfortable and environmentally friendly aircraft. It offers the most efficient combination of regional efficiency with mainline capabilities.

The SSJ100 is distinguished primarily for its comfort. Compared to the short-medium range aircraft, the SSJ100 is able to provide its passengers and crew with a maximum comfort: wider seating in configuration 3+2 with more personal space for each passenger, more spacious overhead bins to maximize storage for carry-on baggage and even a larger cabin.

The additional value of the SSJ100 is also granted by its high technology and superior aerodynamics, tested in an advanced wind tunnel of Zhukovsky, Moscow Region (Russia).

Sukhoi Superjet 100 family has two turbo-reactors SaM 146 produced by PowerJet, a joint venture between Snecma (Safran group) and Saturn. The engine has been issued the Russian Type Certificate (IAC

AR) and certified by the European Type Certificate (EASA). The engine SaM146, designed and built specifically for the SSJ100, is able to ensure a lower fuel consumption, which means reduced fuel costs, as well as lower emissions.

The SSJ100 incorporates the best of all the most modern Western technology: Thales for avionics; Messier-Bugatti-Dowty (Safran group) (landing gear); Honeywell (auxiliary power unit); Liebherr (flight control system); Hamilton Sundstrand, Intertechnique, Parker, Goodrich and others.

The Sukhoi Superjet 100 cruises at a Maximum Operating Speed of Mach 0.81 and 40,000 feet. The performance of the light and maneuverable SSJ100 and its ability to operate safely and efficiently from small regional airports brings high level of comfort and sophistication to routes previously served only by more basic aircraft.

SSJ100 contracts and deliveries

There is no analogue to SukhoiSuperJet 100 in the world. Designed in partnership with world aircraft leaders it specifies new standard in class of 100 seats' aircraft. Certified by European Agency in aviation security and equipped with the most modern technologies, reduced operating costs and improved environmental performance, Sukhoi SuperJet 100 persuasively proves its universality and reliability to customers from different parts of the world.

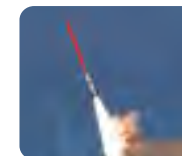
SCAC started to deliver its first production aircraft to customers in spring of 2011. By early 2013 fourteen SSJ100 aircraft in total were delivered to Russian and foreign customers. To date the SSJ100 into service operated more than 17 000 flights for more than 9 000 flight hours.

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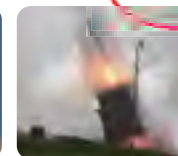
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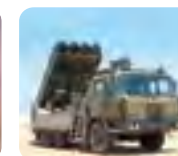
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Dr. Peter Gutmiedl
Head of Asia & CEO India
Cassidian

Cassidian expanding India operations into regional hub

Cassidian intends to use its India operations as a springboard to establish further bases across Asian region. Cassidian has already embarked on local development and production in India together with its industrial partners here, says Dr. Peter Gutmiedl, Head of Asia & CEO India, Cassidian, in this interview to Aeromag Asia.

What is Cassidian's strategic intent in India and what steps have you taken so far?

Cassidian regards India as much more than just an important market. We are investing in this country and its people for a comprehensive long-term partnership. We have already embarked on local development and production in India together with our industrial partners here. This enables us to offer customised solutions uniquely suited to India's needs. Opening of the Cassidian Engineering Centre in Bangalore was a major step forward. It is the first defence oriented engineering centre owned by a foreign company in India and is a living proof of our commitment to this country. Currently, around 60 Indian engineers, extensively trained in our European facilities are working alongside specialists from abroad to design and engineer highly specialised defence and security technologies for domestic and export markets. Recently, Cassidian India was awarded the globally recognised aerospace industry quality certification – EN/AS9100. This achievement highlights our efforts to establish a world-class defence-industrial footprint in India.

You mentioned the Cassidian Engineering Centre in Bangalore. What's the update on that?

It is doing very well. Indians at the Centre have designed and engineered a High Accuracy Air Pressure Measurement

System. It is a critical on-board sensor providing the pilot with highly accurate altitude readings thus contributing to a safe operation of the aircraft in Reduced Vertical Separation Minimum fly zones. In addition, we have engineered locally, a Structurally Integrated Antenna for satellite and GPS communication in aircrafts. The antenna is conformal with the structure of the aircraft thus reducing drag and enhancing its stealth. We are very keen on leveraging the talent at the Engineering Centre to adapt certain products from our global portfolio of UAVs, Radar Solutions and Security Systems to specific Indian requirements and offer our customers here a 'local' solution. Our aim is to firmly embed Bangalore in our global technology network and develop the centre as a single source supplier of certain cutting-edge military related technologies to all our global initiatives.

You are a consultant for DRDO. Can you elaborate on what are you doing with them?

As part of our comprehensive partnership strategy, we are sharing defence and security technologies with India which truly support its indigenization efforts in cutting-edge defence areas. We have a number of consultancy projects with the DRDO. For example, we are consulting DRDO's Aeronautical & Development Agency (ADA) on certain LCA related topics. We

have a contract with DRDO to supply consultancy services for reviewing an indigenous Airborne Early Warning & Control (AEW&C) system. In addition, Cassidian has successfully cooperated with DRDO's Defence Avionics & Research Establishment (DARE) to develop a Missile Approach Warning System (MAWS) for Indian rotary and wide-body aircraft. The sensor has been certified 'indigenous' by Indian authorities and is expected to be produced for integration with India's helicopter fleet.

You have recently been appointed as Head of Asia for Cassidian. What is the strategic rationale behind that?

Under its transformation programme, Cassidian has grouped its future growth opportunities across the world into three geographical markets – Asia, Americas and Europe, Middle-East & Africa (EMEA). In Asia, India has a strategic standing. Now that our presence here has been firmly established, we are building on our base here to strengthen Cassidian's reach in other Asian markets. Basically, we intend to use our India operations as a springboard to establish further bases across Asian region. It is with this background that I have been appointed as Head of Asia, in addition to my function as CEO of Cassidian India. I am now in charge of expanding our India operations into a regional hub and overseeing Cassidian's growth in Asia.



Cassidian and partner Fibcom India Ltd. have been selected to provide digital TETRA radio communication coverage for the new Jaipur Metro Rail. How significant is the deal for you?

It is a landmark win which has positioned Cassidian as a leading supplier of TETRA communication system for the emerging mass transportation market in India. We are committed to contribute to further developments of secure mission critical communication solutions for public safety in India.

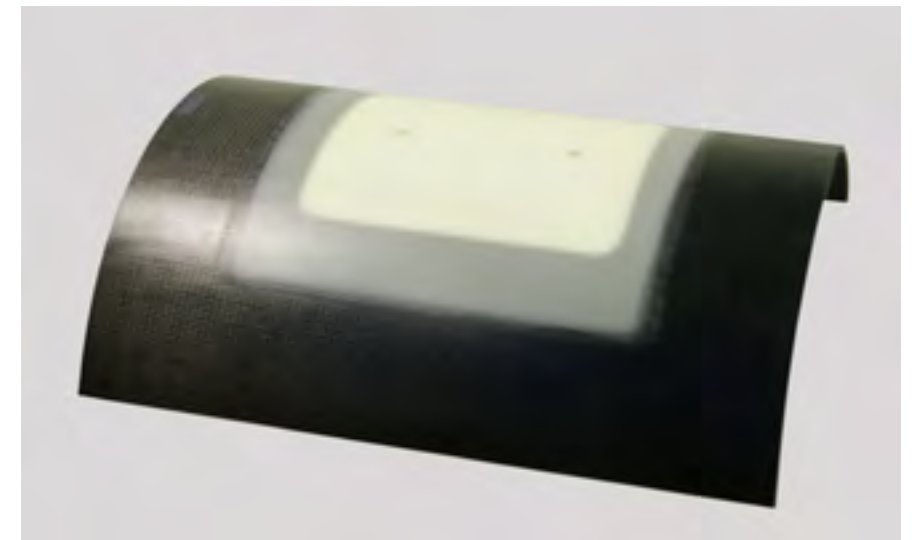
Your thoughts on Aero India 2013? Which products are you planning to bring?

Aero India is one of the premier aerospace exhibitions in Asia. It offers us a great opportunity to interact with our customers and potential partners and to demonstrate our capabilities and technologies. We will be showcasing the High Accuracy Air Pressure Management System and the Structurally Integrated Antenna. As I mentioned before, both

have been designed and engineered at our Engineering Centre in Bangalore. Besides, we will be displaying the Missile Approach Warning System (MILDS) we co-developed with DRDO's Defence Avionics & Research Establishment (DARE). From our global portfolio of UAVs we will be displaying our man-portable, fixed wing,

mini UAV Tracker, Medium Altitude Long Endurance (MALE) UAV Harfang and tactical Vertical Takeoff & Landing (VTOL) UAV Tanan. We will have other interesting capabilities on display too.

For that I invite you to visit us at the EADS pavilion, Hall C, OD-6 at Aero India.





Ready to consider JV for manufacturing in India, says Diehl Aerosystems



R Von Borstel
CEO, Diehl Aerosystems

Diehl Aerosystems is willing to invest more in India and ready to consider joint ventures for local manufacturing. The company's main focus is on the upcoming generation of Indian civil aircraft programs as well as on the retrofit business for all types of different aircraft projects and programs in India, says Mr R Von Borstel, CEO, Diehl Aerosystems, in this interview to Aeromag Asia.

What's your outlook for the Indian market for the segment you are targeting -- aerosystem, air cabin, interior and related areas?

The Indian market offers a very interesting and promising environment that provides a huge potential for our serial and retrofit business. Furthermore Diehl Aerosystems is ready to join and support the Indian aerospace industry. We have already invested and look forward to the next steps within the Indian market.

How is this space growing over the years and what are the growth drivers?

The Indian aerospace market is still growing, especially in the field of public transportation by aircraft. However, the Indian aerospace industry will need to grow even faster particularly with its own products for civil aircraft. Growth drivers basically are the approval and support by the Indian government. We want to take an active part in that evolution.

Tell us about your engagements in India and business strategy, particularly in recent times?

Diehl Aerosystems engagements in India and business strategy consist of a long local presence for many years. We are willing to invest more and are ready to consider joint ventures for local manufacturing. We established a good network with important key decision drivers. Certainly, we are constantly looking for new business opportunities such as emerging new aircraft programs - even from new aircraft manufacturers.

What are the potential contracts you are pursuing in India and what's the update?

We are currently not yet in an active acquisition mode. Rather, our presence in the country is still of strategic nature in order to establish a permanent presence for things to come in the future. Against this background our main focus is on

the upcoming generation of Indian civil aircraft programs as well as on the retrofit business for all different aircraft projects and programs in India.

How is your company positioned to take advantage of opportunities in the Indian market?

With its operational units Diehl Aerospace and Diehl Aircabin as well as Diehl Service Modules and Diehl Comfort Modules, Diehl Aerosystems is a leading and reliable systems supplier for avionics and cabin solutions, with reference customers such as Airbus, Boeing and Embraer. The synergies

arising from the cooperation of the business units put us in a premier position when it comes to establishing a business base for example in matters of new aircraft programs in India.

What are the plans to establish a strong presence in India?

By having completed the installation of our liaison office in Bangalore, headed by Juergen Runge, Diehl Aerosystems is well prepared for collaboration in India, future joint ventures or to invest more in the Indian market. Nevertheless we are looking for new activities and opportunities

in India, primarily consisting of the current procurement of engineering services and IT/software products, as well as preparatory work for potential business relationships in the future.

What are the products/capabilities you are showcasing in Aero India 2013?

We have a joint stand with our colleagues from Diehl Defence in Hall C, Booth 2.6 displaying a selection of our wide portfolio consisting of avionics systems, cabin lighting, cabin interiors up to cabin modules as lavatories and galleys.



BEL eyes big business in homeland security, telecom



Anil Kumar
Chairman and Managing Director
BEL

The business outlook for Bharat Electronics Limited (BEL) is encouraging with major opportunities worth about Rs 25,000 crores likely to mature in the coming one to two years. Seeing a sizeable opportunity in the Homeland Security and Telecom domains, BEL is vigorously pursuing diversification into these businesses, says the Bangalore-headquartered company's Chairman and Managing Director Mr. Anil Kumar in this exclusive interview to Aeromag Asia's Managing Editor Sunny Jerome.

Could you talk about the MoU that you have signed with IAI recently?

Indian MoD has appointed BEL as the Lead Integrator (LI) for the future Long Range Surface to Air Missile (LRSAM) systems for the Indian Navy and Production Agency for manufacture of Radars for LRSAM.

In this direction, BEL and IAI Israel have signed a MoU with the purpose of defining the process and content of cooperation with respect to the production of LRSAM systems by BEL and IAI.

Under the MoU, BEL will function as the LI and IAI will be the design authority and main sub-contractor of BEL for the sub-systems.

Could you talk about the joint venture that you announced with Thales recently?

BEL and Thales, France have signed a Joint Venture Agreement in August 2012 with the clearance of their respective Boards for the formation of a Joint Venture Company (JVC) in the area of Civilian and select Defence Radars subject to obtaining the necessary statutory and Govt. approvals of both India and France.

The proposal has been forwarded to Ministry of Defence for their concurrence

and parallelly FDI approval has been sought from FIPB. The approval of MoD is under progress.

The objective of the JVC is to address a larger share of the Indian and International Radar and Radar Systems business for mutually agreed end user applications.

The JVC is expected to grow as a Centre for development, evolution and customisation of products meeting the needs of both Indian and export markets.

How is the order book position, and what's your outlook on the demand environment?

Our Order Book at the end of November 2012 is about Rs.25,500 crores. The business outlook for BEL is encouraging with major opportunities worth about Rs 25,000 crores likely to mature in the coming 1 to 2 years. Land based EW Systems for Army and IAF, Weapon Locating Radar, Integrated Air Command and control System, EW system for small ships, Coastal Surveillance System, SDR for IAF, TCS prototype, etc. are a few of the programmes expected to be finalised in the near future.

How has been the year 2011-12 for BEL and what's the growth you are

tracking in the current fiscal and what are the goals in this financial year ?

BEL achieved a turnover of Rs.5704 crores during 2011-12 as against Rs.5530 crores in 2010-11, registering a growth of 3.15%. The marginal growth was due to issues like delay in bulk production clearance of new products and partial receipt of items, for a major programme, from consortium partners. The profit after tax for 2011-12 was Rs 830 crores as against Rs 862 crores last year. This decrease over previous year is mainly due to higher employee cost, high material content and lower value addition due to the nature of contracts executed.

R&D continued to be BEL's thrust area for brining in greater indigenisation and value addition and the total expenditure on R&D was 8.12% of the turnover.

Some of the major new products / systems introduced during 2011-12 include Coastal Surveillance System, Tablet PC, Integrated Anti Submarine Warfare Complex and Advanced Torpedo Defence System.

A few of the other highlights have been:

Successful completion of user trials of Weapon Locating Radar by Army.

The Navy successfully completed the Onboard Acceptance Test for Combat Management System for ships.

6 lakh Tablet PCs were manufactured and supplied in record time to the Ministry of Rural Development. These were used for conducting Socio Economic Caste Census to identify Below Poverty Line families.

The first indigenously developed Akash Weapon System was supplied to Indian Air Force.

For the current fiscal (2012-13) BEL is targeting a 10% growth in sales turnover. The other major goals for the current financial year are –

Bulk Production Clearances for systems like 3D Tactical Control Radar, Bharani Radar and Schilka U/G which should help growth in turnover for the fiscal 2013-14.

Obtaining approval of the Indian Government for the formation of Joint Venture Company with Thales, France.

Could you talk about your diversification plans and give an update?

Seeing a sizeable opportunity in the Homeland Security and Telecom domains

BEL is vigorously pursuing diversification into these businesses.

A separate group has been formed in the Bangalore factory to address the Homeland Security market. BEL has developed some products like X-Ray Baggage Inspection System, Under Carriage Vehicle Inspection System and Video analytic software module which are required for the Homeland Security applications. We are also in the process of establishing an IP based Video surveillance system at our Ghaziabad factory for showcasing our capabilities in this area.

BEL is executing a CCTV surveillance project for IAF, Bangalore. We have also expressed our interest to participate in many HLS projects for Govt. / Defence establishments.

In Telecom, BEL is planning to address the huge infrastructure requirements of BSNL, MTNL and DoT leveraging the policy incentives being provided by the Government for products designed and manufactured in India. We are jointly working with reputed design houses for technology products like GPON, DWDM, Routers / Switches, etc. which have a huge

market potential.

Could you talk about some of your key R&D projects, and also about your exports?

BEL is organised into separate Strategic Business Units in key Defence technologies like Military Communication, C4I, Military Radars, Sonar Systems, Electronic Warfare & Avionics, Electro-Optics, Tank Electronics, Antennas and Satellite Communications.

In Military Communication, we are engaged in the design and development of Software Defined Radios for Armed Forces, Troposcatter Communication System, S-band Satellite based ground terminals, VLF Receiver and demodulator, etc. We are also involved in indigenous design of Tactical Communication System and High Data rate Radio Relays.

In the C4I domain, Battlefield Surveillance System, Command Information Decision Support System, etc. are in advanced stage of development.

In Electronic Warfare, Mountainous EW System, Heliborne EW System, GPS jammer etc are being developed.

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Aero India 2013: HAL to Fly Dhruv, Rudra and LCH

HAL's strength in design, development and production will be showcased through its products during the up-coming Aero-India 2013. The major attractions of the HAL's pavilion include in-house designs such as Light Combat Helicopter (LCH), "Rudra" the weaponised Advance Light Helicopter (ALH) and Intermediate Jet Trainer (IJT).

"For the first time, we will present to the world glimpses of prospective multirole fighter (PMF) also known as Fifth Generation Fighter Aircraft (FGFA). This is under co-development with the Russians", said Dr. R.K. Tyagi, Chairman, HAL.

ALH- Dhruv, LCH and Rudra (Mk 4 WSI) will be on flying display. Scale Models of Light Utility Helicopter, Hawk, Light Combat

Aircraft (LCA) and Su-30 will also be on display.

In addition, Pilotless Target Aircraft (Lakshya), Shakti engine, state-of-the-art accessories and avionics from various Divisions of HAL are being showcased.

The other specialities of the HAL pavilion include 3D video mapping of HTT-40, Dornier Glass cockpit, scale models of aerospace structures of GSLV MkII, GSLV Mk III and PSLV. The Rotary Wing Corner will provide the visitors through simulation & visual display, a helicopter view of the technologies, the capabilities and competencies built in the Company. There will also be a holographic projection depicting capabilities of LCA, Hawk, LCH and LUH.



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Strong need for self-reliance in lubricants, says AVI-OIL



J R Nanda
CEO, AVI-OIL

The demand for aerolubes has been static, if not a little less due to the phasing out of certain military aircraft. Though the civil fleet has increased, most of the aircraft are on lease. Therefore, it's necessary to foray into the market of synthetic industrial lubricants providing energy efficiency, wide temperature operation capability and eco-friendliness because of ease of biodegradability, says CEO of AVI-OIL, Mr. J R Nanda, in this interview to Aeromag Asia.

How do you look at opportunities provided under defence offset obligations for AVI-OIL? Any plans on this front?

There is no doubt that Defence offset policy and the obligations to be met by the foreign contracted suppliers in terms of compulsory fiscal or technology investment, offer a lot of opportunities for the Indian aerospace industry to grow at a faster pace and become a global player. However it is necessary that the modalities and time frame must be clearly spelt out in each individual contract to achieve the desired results.

With the huge value aircraft contracts that are in the pipeline, they do offer a small potential in terms of values investment to AVI-OIL for lubricant development, evaluation and certification by the foreign OEMs, but it is yet not clear under which of the items in the list of offset items would these be classified. We patiently wait for our representations to the various forums to be heard.

After all it is evident that "without the lubricants, no aircraft can fly"- and these engineered components should be of the right quality and locally produced to sustain operations of the aircraft for their full life without any foreign dependence.

What's the update on your vision that the

next stage would be to design aerolubes concurrently with the changes in the engine design so that the complimentary performance targets are achieved?

The vision still eludes me. Even though very few aircraft are designed ab-initio and produced in India. Those truly Indian like the ALH (Dhruv) or LCA (Tejas), the designers have rarely considered consulting the lubricant formulators for defining the ultimate performance objective of the engine or other components of the aircraft. It is almost forgotten that the lubricant is another engineering component and the choice of seals, metallurgy and factors like that transfer, wear and corrosion protection depend on the quality and design of the lubricant, which ultimately play a key role for the satisfactory operation and life of the aircraft.

What are the plans vis-a-vis foray into the high performance lubricants space?

We are already manufacturing high performance aviation lubricants, which are available and in use on even the current generation aircraft. If you are referring to space vehicles, one has to assess specifications, of the products required and select the appropriate

chemistry to design these products. This is always possible provided there is appropriate continuous interaction between the equipment and lubricant designers.

How has been the year 2012 to AVI-OIL and what are the goals in 2013?

The year 2012 ends with some satisfaction in having sustained the company's operations and provided the desired logistic support to the Defence Services, and entered the civil aviation business with one domestic airline flying on our products. For 2013 there is hope that the value will grow with the induction of new fleet of military aircraft, and that more of Indian civil airlines would accept our products and consequently realise the logistic and commercial benefit that accrue.

How is the market demand for aerolubes, and also could you talk about your focus on industrial lubricants?

The demand for aerolubes has been static, if not a little less due to phasing out of certain military aircraft (eg. MiG-23, Iskra, Canberra, MiG-25 to name a few). Though the civil fleet has increased, most of the aircraft are on lease. Therefore, it has

been necessary to foray into the market of synthetic industrial lubricants providing energy efficiency, wide temperature operation capability and eco-friendliness because of ease of biodegradability. We have already introduced non-flammable dielectric fluids for power transformers housed in enclosed spaces, Railway traction equipment; synthetic refrigeration compressor oils compatible with non CFC R-134a refrigerants and certain special fluids for submersible tools in offshore operations.

Could you talk about your range of products and manufacturing capacity?

We have a range of high performance products both aviation and industrial, wide enough to cater to every lubrication requirement of any particular aircraft comprising engine oils, hydraulic fluids grease, protective and specialties; and on the industrial side high performance gear, hydraulic, compressor, dielectrics or even plasticizers. The manufacturing capacity is adequate for the present and the next

five years of anticipated growth.

What are the new initiatives in the pipeline?

The focus currently is on timely development and validation by OEMs of the aircraft likely to be inducted in the



coming two to three years - but the long term initiatives that are being taken is the creation of confidence with the aircraft operators so that they realise that we do not only sell 'OIL', we market a service of strategic importance and national

interest.

And finally, your thoughts on Aero India 2013 and expectations

AVI-OIL has been participating in every Aero India from the beginning, even when at its inception in 1993 when it was termed AVIA INDIA! Every time we try to project our capabilities for the need of Self-Reliance for lubricants, the absence of which could ground a fleet in crucial times of non-supply by foreign vendors due to political reasons or sanctions which are a familiar story. The message still has not been driven home enough with counter forces in play all the time. The Aero India 2013 gives us another hope to effectively project this again- but more than that we plan to project something new, keeping in mind the evolution of the Indian Air Force at 80!

Apart from AVI-OIL'S presence, it would also provide an opportunity for us to meet the foreign OEMs and offer them the possibility of including lubricants as a part of their offset commitments!



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Bavarian team to boost trade ties with India



Martin Zeil
Bavarian Minister

A high level business delegation from Bavaria with Minister of Economic Affairs Mr. Martin Zeil will visit India from 17th – 23th February. The delegation is focussing on Environmental technology/renewable energy, engineering, infrastructure and construction in India. The visit will give a further boost to expanding trade relations with India. They will visit Mumbai, Bangalore and Delhi. At Mumbai, the delegation will meet the representatives of TATA group from Engineering, Energy/ environment, Infrastructure sectors. The delegation will meet Maharashtra Chief Minister Prithviraj Chavan and also visit Larsen & Turbo.

The delegation will meet Bangalore Development Authority about future opportunities for Bavarian companies in assisting Land Acquisition, Town Planning and Development, Engineering Development. In Delhi the delegation will meet the representatives of Ministry

of Urban Development and Ministry of Communications and Information Technology.

Economic power house

Bavaria, the largest state of Germany with Munich as its capital is Germany's strongest and fastest growing economy with a GDP of 446.4 billion Euros in 2011. Munich is rated the best for high quality of life in Europe. Bavaria is home to a great number of global players like BMW, Siemens, Audi, Allianz, Infineon, Puma AG, Adidas AG, Infineon, MAN and many small and medium sized companies of world class repute. Bavaria is also a world leader in the field of clean technology, automotive, materials & aerospace engineering, ICT, life sciences, optronics, nanotechnologies, industrial & automation technologies and biotechnology.

Innovation

Over the years, Bavaria has transformed itself to an economic super power due to consistent efforts of innovation. Siemens, the world leader in every emerging field of electrical and electronics engineering and of medical and communication devices and systems; BMW and Audi, the synonyms for automotive excellence and elegance in automobile industry are all results of innovation. International companies like Microsoft, Intel, Hewlett Packard and Toshiba in IT industry have made Bavaria their home due to innovation.

Another important strategy by the government has been to ensure that the growth is state wide. Fürth, Erlangen, greater Nuremberg is major centre of medical, wireless and optronic technologies. Augsburg is a leader in environmental technologies, aerospace production and services, and materials engineering with Regensburg and Würzburg being centres of biotechnologies and high-tech services. Innovative, market-leading companies are to be found in virtually every town and village in Bavaria due to the state's

policy of building institutions of higher education and research all throughout the state.

Invest in Bavaria

"Invest- in-Bavaria" is the special division within the department of Bavarian Ministry of Economic Affairs, Infrastructure, Transport and Technology. The Invest in Bavaria team assists international companies, which are looking towards setting up offices in Bavaria, with information, location analysis, data support, and a professional network in the business and governmental area and helps investors to make the best decisions. It is specifically dedicated to foreign direct investment policies and business location marketing. The State of Bavaria opened its Office in India at Bangalore in 2001 to offer first hand service for Indian investors. For more details please visit www.invest-in-bavaria.in



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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.



CEMILAC widens its horizons



Dr K Tamilmani

Distinguished Scientist & Chief Executive
CEMILAC, DRDO

With the changing pace of technology and equipment, CEMILAC's responsibilities have increased a thousand fold. CEMILAC is working towards a goal where CEMILAC Certification is globally recognised, says Dr K Tamilmani, Distinguished Scientist & Chief Executive, CEMILAC, DRDO, in this interview to Aeromag Asia.

Could you share your thoughts on how airworthiness assurance is emerging as an important discipline?

Ever since man endeavored to fly, safety and airworthiness have been major issues of concern. Operational demands together with extreme environmental stringency make aviation an activity least tolerant to failures. Over the last one and a half decades there has been significant advancement in the Aerospace activities in India. Aviation materials, systems and complexities of missions have brought in greater challenges for airworthiness assurance functions. Airworthiness assurance is fast emerging as an important discipline and need to account for frontier projects like Light Combat Aircraft, Advanced Light Helicopter, Light Combat Helicopter, unmanned airborne vehicles, advanced missile systems, SARAS, FGFA and Aerostats etc.

Could you talk about CEMILAC's engagements on providing concurrent airworthiness certification support to indigenous development?

Actually, views of CEMILAC are sought by the ministry at the project definition stage itself. CEMILAC is associated with the project from the requirement stage and all design and development activities are progressed concurrently with certification activities such as design evaluation, analysis and test activities.

While we have been working on LCA, ALH, LCH etc., it has been observed that concurrent certification results in saving time and cost, as it gives space to remedial actions at the appropriate time.

Could you talk about your work in regard to verification of upgrades and integration of imported /indigenous systems?

All aircraft last longer than the careers of the original designers. Upgrading the aircraft with the latest systems becomes necessary for improved performance as well as increasing the life further. Airworthiness certification of such upgrades, updates is always a tricky issue. We have to ensure that in the process of upgrading and changing the equipment, we do not reduce the original levels of safety. This is a challenging task and our regional centres have been doing good work in these areas. The clearance for installation or use of the item or equipment is given by the Regional Centre for Military Airworthiness (RCMA) after ensuring that the item/equipment meets all airworthiness requirements. The platform RCMA's give support during integration of the unit. We have worked on Boeing P8I, MiG-27, Su-30, Jaguar etc.

Could you elaborate on widening horizons of CEMILAC?

Yes, with the changing pace of

technology and equipment, CEMILAC's responsibilities have increased a thousand fold. Airworthiness Assurance is being given to UAVs and Missiles, and other aero programmes. We are involved in fuel certification. A new impetus has been given to indigenous propulsion programmes. We are also extending Airworthiness to exported platforms. CEMILAC is working towards a goal where CEMILAC Certification will be globally recognised.

Could you throw some light on core teams of CEMILAC, Areas of work, strength and competence?

The Centre for Military Airworthiness & Certification (CEMILAC) performs Certification and Airworthiness Activities related to Aircraft, Helicopters, unmanned Aerial vehicles, Air Launched vehicles, Engines and the Systems operated by the Air Force, Navy, Coast guard and Army. CEMILAC's corporate office is located at Bangalore and regional offices at different aero development centres of India. The nature & work of CEMILAC in DRDO is pretty unique in the sense that CEMILAC is a Service Oriented Institution rendering AIRWORTHINESS CERTIFICATION SERVICES for military aircraft and airborne stores.

Our spectrum of work is wide. It encompasses approving Designs, Performance, System integration, ATPs, Software IV & V and certification

of Ab-initio programmes. Airworthiness Assurance in Licence manufacture covers approval of Modification, Deviation Assessment and Failure Analysis. We undertake certification of Bought Out items. We also provide continued airworthiness to all aero platforms.

Our strength lies in the expertise gained over the four decades of concurrent involvement with aircraft design, development, manufacturing and operational deployment involving a wide range of technologies and methodologies. We have the capability to undertake certification of Full Fledged Combat Aircraft, Helicopters, Engines, Systems, Equipment and Software programmes. While we have the ability to devise certification requirements for complex, electronic hardware of radars, communication systems, EW systems and electro-optical payloads for various platforms from flight safety and mission criticality point of view we are mature enough to impartially safeguard the intellectual property of a developers by ensuring confidentiality of information. We have core teams to certify and ensure airworthiness in each of these areas.

What are the new initiatives of CEMILAC?

CEMILAC has risen to the challenges posed by the rapid development in aeronautical software and the UAV programmes. We have already formulated and established procedures like the DDPMAS software certification and the DDPNAV to certify them. We have conducted training for scientists and technologists of other laboratories so that it becomes easier for them to follow the DO standards – DO254 for hardware and DO178 for software. Apart from that, we at CEMILAC believe that awareness on the status of Indian Aeronautics should be disseminated throughout the country, to different genre of people. We also strongly believes that young minds are the future of the country and take the initiative to conduct "Aeronautical Awareness Programme" at various educational institutions of Anna University and VTU, Karnataka, IITs and IISc. We have conducted various seminars/workshops on indigenisation of aeronautical products of national importance where in DRDO/HAL would display products that could be indigenised, and the delegates to these seminars were Indian private industries. To sum up we will be working towards self reliance through promoting indigenisation.

Please share your thoughts on Aero India 2013 and the capabilities you are showcasing in this mega Bangalore event?

CEMILAC has been assigned the responsibility of conducting the Aero India Seminar, a precursor to the Airshow, for the third time consecutively. There has been a continued improvement in the conduct of the seminar. This year the theme is 'Aerospace Products

Challenges in Design to Deployment' and we have 62 speakers, out of which 52 are invited talks and 12 are contributed. Of the 50 invited talks, 23 are Indian speakers and 27 from the rest of the world. The seminar is of three days duration with 15 sessions, on diverse topics.

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Potential in India revolves around industrial partnership, says MBDA



Loïc Piedevache
India Country Head, MBDA

India has expressed a number of requirements for which MBDA is proposing solutions. MBDA has a suite of weapons capable of really optimising MMRCAs mission capabilities, to control the skies in terms of air-to-air combat and to carry out precision ground attack with the lowest collateral damage, says Loïc Piedevache, India Country Head, MBDA, in this interview to Aeromag Asia

MBDA is the defence sector partner of choice for many countries. What are the factors that contribute to such a position?

MBDA has an extensive range of products that cover all three combat domains – air, sea and land. This is a unique capability in the sector, so clearly we are very well positioned to provide a guided weapons solution for the full range of operational requirements and for a wide number of air and surface platforms. We also offer a level of technology and through life support to our customers which again distinguish us from the competition. If you consider some of the missiles that we include in our range, missiles such as Mistral with its unmatched 96% success rate in all firings, in Exocet we have probably the world's most redoubtable anti-ship weapon, MICA the only air combat weapon with a choice of two seeker variant and of course the eponymous Milan, then you can easily understand why around 90 customers around the world have shown their trust in MBDA. This is a trust that we take very seriously as a company.

As a multi-national group what special advantages do you derive in business promotion? Does it help you to meet competition better?

Being multi-national has many advantages. MBDA is the only fully integrated multi-national defence company in the sector and is able to

draw on the best skills throughout Europe. Political support is vital in the defence world so of course at times and depending on where we are trying to do business, having the backing of one or more of our domestic governments is a huge bonus. Being multi-national calls on the ability to coordinate and cooperate. When customers are looking for a partner to advance a cooperative programme, who better than a company whose very essence is based on international cooperation? Being multi-national gives us the advantage of not only a wider skills base but also a wider range of experience. If you consider how many different air, sea and land platforms our domestic customers deploy, then you can see how we have an advantage in understanding the issues involved integrating weapons onto a diverse cross section of global customer aircraft, naval vessels and land vehicles.

What role does the Future Systems Directorate play in devising your growth strategy?

Even though we have a very broad product range and are currently working on a number of weapons destined for entry into service beyond the 2020 time frame, the nature of our business with products which take some time to develop, validate and enter into service means that we have to be very forward looking. Drawing on information from our customer contacts, equipment end-

users, our suppliers, academia, research institutions and the like and of course our own understanding of developing operational requirements, we are able to prepare for the future. Most of this upfront activity involving concept studies and R&D activities is funded by MBDA. It is a necessary investment in the future and it means that when the customer comes to us with a new, future requirement, we are well placed and also well prepared to start working on concepts and assessments before transitioning smoothly into the development phase. This directorate, as well as being a catalyst for innovation, also allows MBDA to prepare itself strategically and industrially for the future.

You are a world leader in developing missile systems. What are the most sought after products in India?

MBDA has become a world leader thanks to its mastery of the full range of technologies and is indeed known for its unique ability to offer a range of products providing solutions for each of the three armed forces. With regard to specific products, India has ordered MBDA's Exocet anti-ship weapon, the Mistral ATAM air-to-air helicopter weapon and of course, the Indian company BDL has been manufacturing Milan under licence for quite some time. An important part of the Mirage upgrade will see MICA becoming a key part of the IAF's weapon's inventory.

BEHIND THE SMARTEST INNOVATIONS IN AEROSPACE ENGINEERING IS ONE NAME – SAFRAN



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MiG Corp. fortunes on the upswing

After implementation of its current contracts, MiG Corp. will improve its status-quo on the world market of combat aviation significantly. According to estimates of the Center of analysis of world arms trade/CAWAT, a Moscow-based non-state think tank, the MiG's share in volumes of the worldwide exports in fighters during a period of 2012 – 2015 will come up 11.3% in numbers and 7.7% in cost. In comparison the CAWAT quotes the same parameters of the period of 2008 – 2011 as 5.2% and 3.5% accordingly.

The main contribution to this double increase will be done by export supplies of the unified family of the MiG's fighters, including nowadays MiG-29K/KUB ship-borne a/c and MiG-29M/M2, their analogues of air-base operation. At the end of December 2012, the Indian Navy got the first four MiG-29K/KUB of the batch of 29 aircraft, which are subject of the contract of March 2010. The previous deliveries of 16 MiG-29K/KUB had been implemented during 2009 – 2011 as per the contract of 2004.

Another export programme of MiG Corp. is an up-gradation of the IAF's MiG park under the MiG-29UPG Project. First deliveries of three up-graded a/c were made in December 2012. The further up-gradation of MiG-29s will be implemented in India. Within the MiG-29UPG Project had been developed the most advanced version of modernization of the original MiG-29 fighter. In comparison with its



predecessor – MiG-29SMT – it features more advanced avionics, in particular its EW system. Being in its avionics' performances similar to the MiG-29K/KUB/M/M2 family, the UPG's variant is similar to the original MiG-29 fighter in its glider, air engines and a/c systems.

This option opens 'a window of opportunities' for countries, which are eager to find out a cost-effective variant of fast increasing of efficiency of their combat aviation. Sources inside the MiG Corp. say that for some time-being MiG-29UPGs will be available not only under the up-gradation programme, but as new aircraft as well.

Meanwhile, in a middle term perspective, MiG Corp. will totally shift to manufacturing of more effective and more costly fighters of the unified family. Besides MiG-29K/KUB and MiG-29M/M2, the family will umbrella MiG-35 fighter as well. This aircraft was included

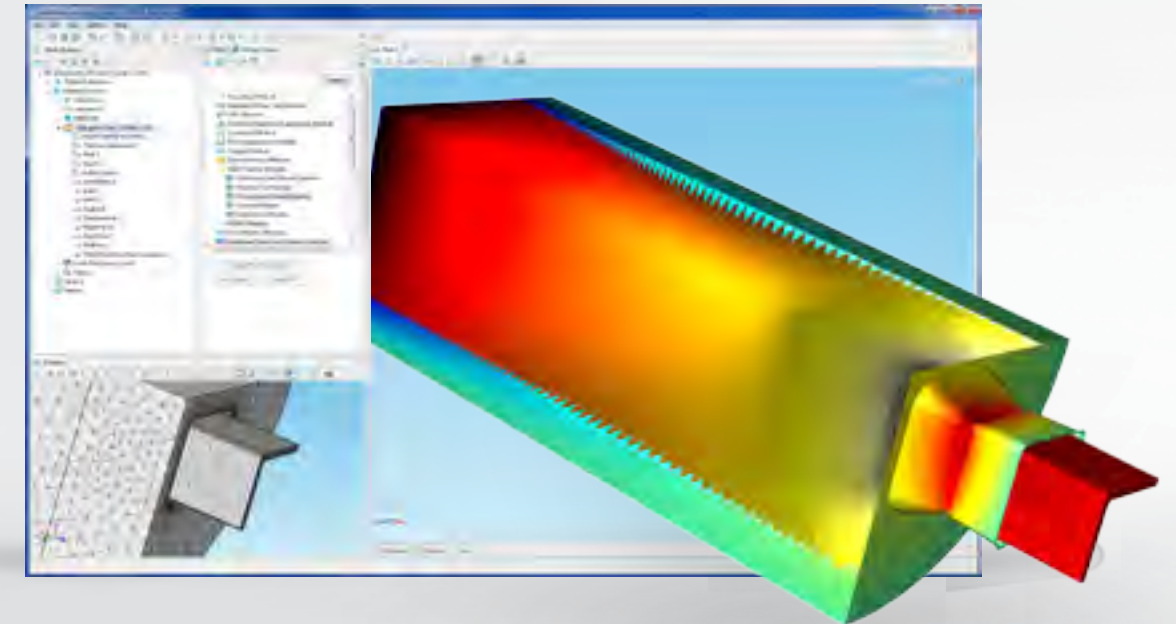
into the Russian Air Force's acquisition programme. This decision was officially confirmed by lieutenant -general Victor Bondarev, just appointed commander-in-chief of the Russian AF.

After signing-up of the contract with the Russian MoD on deliveries of 20 MiG-29K and four MiG-29KUB ship-borne fighters, MiG Corp. has got a lucrative part of the Russian internal market. First part of this batch is being manufactured at the MiG Corp.'s production facilities and is to be delivered to the customer during 2013.

As stated by Mr. Sergei Korotkov, CEO, MiG Corp., aircraft of the unified family will form up a basis of the Corporation's manufacturing programme. As far as long-term perspectives are concerned, at the end of 2012 it became known, that RAC MiG in teaming-up with Sukhoi Corp. has joined the programme of un-manned combat system. Since 2012 this programme had been financed by the Russian MoD.

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Liebherr-Aerospace bullish on Indian market opportunities

Josef Gropper
COO
Liebherr-Aerospace & Transportation SAS

Liebherr Group sees India as a market full of opportunities and is fully geared up to be a part of the growth story. Liebherr's Aerospace and Transportation Systems division is in an expansion mode in India, where it's seeking to strengthen partnerships, says Mr. Josef Gropper, COO of the divisional control company Liebherr-Aerospace & Transportation SAS, in this exclusive interview with "Aeromag Asia"

What's the potential you see for your products and services in the Indian market?

We see a huge potential for our aerospace and transportation products and services in the Indian market, due to the rising figures of air and railway traffic and the resulting growing fleets of Indian airlines and train operators. In addition, the Indian supplier base offers a wide array of partnership opportunities that may bring substantial value to our products for sale on the Indian market and international markets.

Liebherr-Aerospace established its office in Bangalore in 2009. The purpose of the office is to assist the company in identifying, selecting and monitoring Indian suppliers, both service suppliers and parts suppliers.

(Our Indian office contact: Mr. Kamaljith R P, radhakrishnan.kamaljith@liebherr.com)

What are your plans to penetrate the Indian market?

Our plans are to substantially grow business in India based on three development axes:

First, the consolidation of our business as a supplier to the Indian aircraft manufacturing industry, and mostly as a supplier to several divisions of Hindustan Aeronautics Limited (HAL), to whom

we have been providing several key systems and products for several aircraft and helicopter programs for more than four decades;

Second, the development of customer support services to all the Indian operators of aircraft which are built by international airframers and equipped with our systems (aircraft built by airframers such as Airbus, Boeing, ATR, Bombardier, Embraer, Dassault Aviation,...);

Third, the intensification of the relationship with the Indian supplier base, to further build upon the business relationship we have already established for some components like gears or some services like engineering services. In this respect, the partnership we are forging in the context of the Rafale contract will allow us to substantially accelerate the development of the supply chain in India;

We are convinced that our strategic approach, based on technology leadership, high-quality products, a long-term industrial view, global competitiveness, and respect for the community and the environment perfectly suits the needs of the Indian aerospace market.

Could you talk about your focus on the Indian aerospace market and your business expectations from this space?

Liebherr-Aerospace today supplies

flight-critical systems and components in all three of its product lines (landing gear, flight control and air management) to such major Indian aircraft programs as the HAL Jet Trainer 36, the Advanced Light Helicopter, the Dornier 228 or the Light Combat Aircraft.

We are planning to further expand our long-standing business with HAL through proposals on other programs in development like Light Utility Helicopter, SARAS and HTT40, to name a few.

In addition, we are preparing the technologies and the partnerships with adequate Indian partners to propose best value products for upcoming structuring programs in India like Military Transport Aircraft, Regional Transport Aircraft and Next generation Fighter Aircraft.

The growing fleet of aircraft which are not built by Indian airframers (Boeing, Airbus, Dassault Aviation, Bombardier, ATR, Embraer,...) also offers increased opportunities for the development of our customer service business.

We will address these increasing opportunities through the reinforcement of our footprint in Bangalore, which will grow from a procurement-focused office to an engineering support- and customer support-oriented office.

Apart from aerospace, which are the other business verticals that

you are targeting in India?

We are also looking at the potentials regarding the rail vehicle sector as Liebherr-Transportation Systems

offers complete system solutions and components which suit the individual needs of rail vehicles manufacturers and operators. In this sector, we are also preparing developing the technologies in our product lines – HVAC systems, roll compensation systems and power supply systems – that will enable the Indian Railway industry to go for the next generation of mass passenger (?) transport in way that is more efficient, safer, and more respectful of the environment and of the community.

Are there any tie-up, partnership or joint venture initiatives in the pipeline in India?

We have developed solid business relationship with a number of customers, suppliers and other partners in India. We are in the process of further developing these relationships. There is no specific plan at the moment for any joint venture, although we are open to the form of

collaboration that will turn out to be the most efficient and the one that suits best the opportunities we are pursuing.

How do you see business environment in India and are there any policy changes you hope to see by the Indian government?

We consider the business environment in India as being friendly and highly promising. Like all the companies from foreign cultures, we are sometimes a bit surprised by the duration of decision-making processes and we would appreciate it if they were shorter.

What are your short-, medium- and long-term goals for the Indian market and the vision?

It is our strategy to develop industrial footprint close to the customer base, and India is certainly in the process of becoming one of our major customers. We even see India as being on the path to become world's # 1 (?) aerospace and transportation market for our products in the long term

Our objectives in this respect are:

Short-term: expand the customer base through contracts with additional HAL divisions/ additional HAL programs; expand our supplier base, especially through the RAFALE contract; expand our footprint through engineering support and customer support.

Mid-term: increase our footprint to be able to successfully contribute to upcoming major Indian programs such as Military Transport Aircraft, Regional Transport Aircraft, Next Generation Fighter Aircraft; start our Transportation activities.

Long-term: be a full Indian aerospace and transportation player.

We are proud to contribute to the development of the Indian industry and to the welfare of the people of India through our technologies, our values and our investment.

Any other initiatives you wish to discuss vis-a-vis your business strategy in India?

One of the strong pillars of Liebherr is its long-term strategy and visions. We consider this corporate value as being a particular asset in the Indian context.

Seeing significant upside growth in India: QuEST



Walt Sirmans
Senior Vice President, Aerospace

QuEST Global Manufacturing's near term goals are to structure the company to take advantage of continued growth opportunities while ensuring that its core competencies and business fundamentals remain strong. The company's manufacturing mission is to deliver 1,000,000 reliable manufacturing hours by 2016 and it is on track to achieve that goal, says Walt Sirmans, Senior Vice President, Aerospace, in this interview to Aeromag Asia.

Could you talk about your recent joint venture agreement with Saab?

This joint venture brings QuEST resources and India market presence together with Saab's over 75 years of aero-structures experience. This will offer significant benefits to our customers as we join together to produce aero-structures assemblies for the global aerospace market.

How has the year 2012 been for the company and what are the near-term goals?

We experienced significant revenue growth in 2012 that also brought with it many challenges as we scaled the business upward and, we're seeing significant upside growth as we go into 2013. Our near term goals are to structure the company to take advantage of these continued growth opportunities while ensuring our core competencies and business fundamentals remain strong. We're investing in people, processes, and tools to strengthen how we do business.

Could you talk about growth strategy -- both organic and inorganic?

Our new joint venture with Saab as well as our established JVs with Magellan in Special Processing and Aubert Duval/ Setforge in the Forgings area are indicative of our growth strategies. Partnering with established global aerospace companies

provides QuEST not only with revenue growth opportunities but, it also allows us to advance our overall technical capabilities while delivering value to the customer.

What's your outlook on the defense offset opportunities?

There is tremendous potential in this area as India continues along the path of defence modernisation and associated major acquisition programmes. In almost every area of our business, our customers provide products to the OEMs who are committed to meeting offset obligations to the GOI. There is tremendous opportunity in leveraging a streamlined offset process for the benefit of India at large and industry as a whole.

Could you talk about your manufacturing capacity?

QuEST operates around 100,000 sq. ft. of manufacturing space with over 50 precision machining centres, sheet metal fabrication equipment, and state-of-the-art quality inspection processes. Our capacity is continually expanding as we ramp up production for on-going projects and prepare for new projects under bid. Our Manufacturing mission is to deliver 1,000,000 reliable manufacturing hours by 2016 and we are on track to achieve that goal.

What are the new initiatives?

We are pursuing a number of initiatives to assure world class quality and delivery as we continue to grow. While our businesses have established AS9100 and NADCAP certifications, we are increasing our focus on continuous improvement methods, software tools, and lean manufacturing.

Share your thoughts on Aero India 2013, and what are the capabilities you will be showcasing in this mega Bangalore event?

Aero India 2013 is the premier event in the region to showcase Aerospace industry capabilities, which is particularly important at a time when Aerospace is seeing significant growth and emerging as a major business segment of the Indian economy.

QuEST Global Manufacturing is showcasing capabilities consistent with its vision to emerge as a preeminent player among private aerospace companies in India. We will continue to focus on our highly successful Special Economic Zone established in Belgaum, Karnataka which, together with our global aerospace partners, forms the backbone of our aerospace supply chain ecosystem. Finally, Aero India provides a great platform to network and build new alliances, and reinforce existing relationships and we're excited to be a part of it.

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The astronautics industry also counts on our drive systems. These can be found, for example, in the NASA rover Opportunity, which has been in action on Mars since 2004.

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India needs a comprehensive aerospace policy: UTC



Chris Rao
Vice President & Member of the Board, United Technologies (UTC)

UTC Aerospace Systems is excited about the prospect of additional work in India as the market and customer demands increase. The company's growth in India has afforded it the opportunity to become even more globally competitive in the operations and engineering arenas, says Mr. Chris Rao, Vice President & Member of the Board, United Technologies (UTC), in this interview to Aeromag Asia.

Could you talk about UTC's aerospace business in India and how it's been growing in recent years?

We have a manufacturing as well as a Design Centre in India catering to our global requirements.

2012 was a productive year for us, especially since we opened our second campus in Bangalore. As the industry grows, we will continue to look for ways in which we can grow to meet the demand and provide our customers with what they need when they need it.

How was 2012 and what's the roadmap you see in India going forward?

Again, 2012 was a good and productive year for us. We are pleased that the merger of Hamilton Sundstrand and Goodrich Corporation which formed UTC Aerospace Systems enables us to offer a wider range of products and services to our customers in a 24/7/365 global environment. We are excited about the prospect of additional work in India as the market and customer demands increase. We will look for continued ways to grow and change with the market demands. India is a significant market for us.

What is the level of your engagement in India now? Any plan to widen your reach?

We opened our second campus located at Whitefield in Bangalore. Bangalore is known for being the aerospace capital of India. Our second campus is about two miles away from the existing India campus and India Design Centre. We offer exceptional operations, research, development, engineering and supply chain support services to the aerospace industry for total integrated operations. Our workforce is strong, with a highly talented and educated staff on board. As the aerospace industry grows, we will continue to respond to the needs of our customers. And as market demands increase, we will continue to look for additional opportunities to enhance our already strong work force. Our growth in India has afforded us the opportunity to become even more globally competitive in the operations and engineering arenas.

What's your take on the business environment in India? Are there any policy issues that you would like the Government to address?

The Indian economy is doing well and is expected to grow at a good pace over the next 20 to 30 years. I believe the Indian Aerospace Industry is at a nascent stage and the Government of India needs to prioritise this sector. There is a local industry waiting to happen due to the offset requirements on our military spending as well as commercial growth in airlines with India needing in excess of 1000 commercial aircraft in the next 20 years. There needs to be a comprehensive aerospace policy and substantial incentives to make this industry a strategic industry for the future. India continues to make great progress in welcoming and inviting the aerospace industry and new businesses into their country. We look forward to continued dialogue and partnerships working with our talented work force to address the needs and demands of our customers and the aerospace industry overall. With continued growth in population and business conducted in India, the need for transporting people throughout the country becomes more evident. And



as more businesses do business in India, more aircraft and more flights will be required to accommodate such business growth and must be addressed.

What in your assessment is the growth potential of Indian aerospace sector?

Again, we are optimistic about the growth potential of the Indian aerospace sector. As stated before, as businesses grow, there must be ways of transporting people to and from India for business and leisure travel. India continues to grow in population and the aerospace industry will continue to be of increasing importance in the country to help find ways of transporting people throughout the country.

How is the growth of your non-military commercial business in India?

We added the second campus in the first quarter of 2012 and we continue to look for new opportunities to grow our business.

We have a rather significant presence in Bangalore where we manufacture aircraft evacuation systems, aircraft lighting systems, aircraft cargo systems, pilot, co-pilot and cabin attendant seats, sensors, actuation systems and auxiliary motor assemblies. We have over 1,600 employees at our campuses, including our India Design Centre.

Perhaps there is opportunity for the regional/business aircraft and commercial aircraft business to flourish simply because of the need to transport business and leisure travellers throughout India.

What are the other initiatives in the pipeline as far as India market is concerned?

We strive to provide our customers with the products and services required. As market demands change and grow, we anticipate addressing those needs and providing exceptional customer service accordingly.

What are your thoughts on and expectations from Aero India 2013? What are the capabilities you are showcasing in this mega Bangalore event?

We are looking forward to exhibiting at Aero India 2013. It has been an exceptional show for us where we can display our products and capabilities and meet potential new customers and future employees. We will be showcasing our crash resistant SK3000 helicopter passenger seat, miniature aviation life raft for regional and business jet aircraft, inertial sensors used for guidance, navigation, control and targeting applications, electric helicopter hoist, aircraft Cockpit Data Management System, model Unmanned Aircraft Systems (UAS), and a TERPROM terrain referenced navigation demonstrator, to name a few items. Please stop by our booth to take a look at our offerings and learn more about UTC Aerospace Systems at www.utcaerospacesystems.com

HAL selects ALKAN Release unit

Acknowledging their expertise in the aeronautical field, the high level of quality and innovation by using the latest technologies, the French company ALKAN, is the "genuine partner" of all project leaders as well as aircraft manufacturers, such as Dassault Aviation, Thales, MBDA, Bae Systems, Embraer, Bell, Sikorsky, Eurocopter, Raytheon, SAAB, etc... ALKAN have the "mastery of weapon carriage and ejection equipment" for military aircraft, and specialize in Store Management Systems as also ground servicing and support activity.

With such international recognition, ALKAN equipment are in operation in more than 80 countries and are qualified on more than 70 different aircraft both military and civilian like the Mirage 2000, Rafale, Gripen, Black Hawk, Tiger, etc...

The company has delivered to India carriage equipment for the Mirage 2000 operated by the IAF. Such equipment includes all centerline, inboard and outboard pylons for Mirage 2000 with their inbuilt equipment; and the engine removal trolley for M53 Mirage 2000 engines. ALKAN release unit type 2037 has been selected by HAL for the ALH-WSI and all future armed helicopters being manufactured and designed by HAL. A Transfer of Technology agreement has been signed to enable HAL to locally manufacture and overhaul the 2037 Release Unit.

As ALKAN CEO Armand Carlier stated: "This agreement clearly demonstrates the confidence placed in Alkan product and organisation. We are very proud of this long term partnership with HAL, I am personally following the management of such a project and believe this TOT is the first stone of a long future collaboration in India. We are happy to support the growth and expertise of the impressive Indian aerospace Industry".

Elcom Systems JV with Russian Helicopters

Elcom Systems Private Limited, a company promoted by India's SUN Group, have signed in New Delhi on December 24, 2012 a Joint Venture Agreement for setting up in India a modern industrial facility for manufacturing of Russian models of Helicopters (both Ka- and Mi- brands).

The joint venture will serve as an industrial base for advancing the transfer of technology and manufacturing for high-tech rotorcraft products from Russia to India, and, potentially, to jointly build access to the global market. The JV will be capable of manufacturing key aggregates and eventually perform the final assembly of helicopters, as well as providing on-the-ground services and flight testing.

The JV will be eligible for implementing offset projects under various procurement tenders in India. Both partners also plan to jointly establish a Helicopter Training Academy in India to train flight and maintenance personnel, as well as to establish in India, in collaboration with other Indian partners, a Joint Development Centre for developing new modifications and models of helicopters that would address the growing needs of both civil and defence sectors in India and Russia.

Elcom Group consisting of Elcom Systems and Elcom Innovations was established by the SUN Group, a leading principal investor in India and other emerging markets. The company aims to be a significant player in the Aerospace & Defense and Homeland Security domains focusing on electronics, communications and avionics. ELCOM will deliver best-in-class products and services enhanced by manufacturing facilities, research & development capabilities and partnerships with global players.

India is an important market: COMSOL Multiphysics



Vineet Dravid
Managing Director, COMSOL

India is an important market for COMSOL Multiphysics Pvt Ltd as there is a growing emphasis on applied research in the industry and in basic research in governmental labs. The company continuously works on improving its existing software and release new products to better suit its customer needs, says its Managing Director Vineet Dravid in this interview to Aeromag Asia.

Could you throw light on the product capabilities and efficiencies of COMSOL Multiphysics?

COMSOL Multiphysics is a physics based simulation software which helps to better understand various physical phenomena and processes. Electromagnetic phenomena, fluid flow, heat transfer and stress analysis are some examples of the physics which can be simultaneously coupled to accurately model processes.

This can significantly speed up product development of individual component as well as modeling complete product behaviour, enabling quick optimization and thus minimising prototyping.

What about the recent product launches?

We have recently launched a tool for fatigue analysis, the Fatigue module, which helps predict component life. We have also launched a Livelihood to Excel, which allows engineers to run COMSOL from within MS Excel, thereby providing a bi-directional interface between software.

How does COMSOL help accelerate business and overcome design challenges?

As product lifecycles keep reducing,

there is more pressure to get newer products to the market faster. COMSOL can be used to model real life processes on a computer. This reduces the time required to get a new product to the market, as expensive prototyping can be minimised by doing the testing and optimisation on the computer.

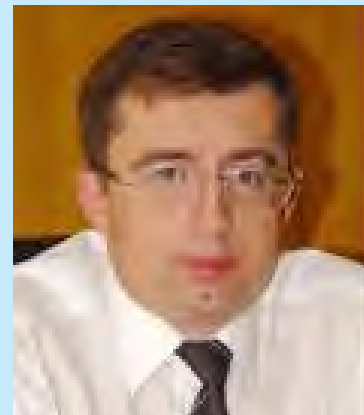
How do you see India as a market, how has been the company's growth in this country over the years and what are the growth triggers going forward?

India is an important market as there is a growing emphasis on applied research in the industry and in basic research in governmental labs. Engineering services outsourcing is another growing area for simulation.

What are the other initiatives in the pipeline?

We continuously work on improving our existing software and release new products to better suit our customer needs. In addition, we host an annual conference in Bangalore in November where we release new products and provide training on various aspects of physics based modelling.

Andrey Kalinovsky appointed President of "Sukhoi Civil Aircraft"



The "Sukhoi Civil Aircraft" Company (SCAC) Board of Directors appointed Mr Andrey Kalinovsky as the new President by replacing Mr Vladimir Prisyazhnyuk.

During the same Board of Directors' meeting, Mr Mikhail Pogosyan - President and Chairman of the Executive Board of United Aircraft Corporation (UAC) - was appointed SCAC Chairman of the Board replacing Mr. Igor Ozhar. The new Chairman commences his duties immediately upon his election.

These new appointments to senior positions are associated with challenging goals set by the Company to boost the Sukhoi Superjet program and ensure the SSJ100 aircraft's success.

Mr Kalinovsky moves from the position of General Director of Novosibirsk Aircraft Production Association (named after Chkalov NAPO, Subsidiary of Sukhoi) since July 2007. In order to comply with the state-of-the-art international production standards, modernisation and upgrade of the production facilities together with personnel advanced training at JSC NAPO was organised and implemented under Mr Kalinovsky management.

He had assumed the role of First Vice President of Production with SCAC and Director of SCAC Komsomolsk-on-Amur Branch since May 2011.

Under Mr Kalinovsky's direct management, the manufacturing of the SSJ100 components had been arranged in Novosibirsk (Russia) as well as the aircraft assembly line at SCAC Komsomolsk-on-Amur Branch.

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Mahindra Satyam takes wings



Dr.S.Ramaseshan

M.K.Chandra Bose

Aerospace & Defence is a key growth sector for IT major Mahindra Satyam. The Aerospace division has emerged as a significant player in aerospace within a span of a few years. As large scale systems integrator the company is geared for strong growth through collaborative and global partnerships as the demand for civilian and defence aircraft multiplies. Dr.S.Ramaseshan, who certified the first Light Combat Aircraft, is Vice President, Aerospace Integrated Engineering Solutions (IES). He is responsible for the delivery of aerospace engineering solutions to key global aerospace OEMs. Dr.Ramaseshan who holds a doctorate in Aerospace Engineering is an expert in aerodynamics and flight mechanics. In an hour-long interaction with Aeromag Asia, he gives an overview of his company's performance, engagements with partners and challenges ahead. He exudes optimism on tapping the new opportunities in the backdrop of emerging scenario of public-private partnership in defence.

You are a relatively new player in aerospace. What has given you the confidence to take on established global players?

Some seven-eight years earlier it was a challenge to convince overseas customers with our limited commercial aero plane competency. Now we are on par with any other competitor. Partnerships with foreign firms have given us more confidence. The whole growth in aerospace industry in India has taken place only in the last 10-12 years. It is programmes like the development of Light Combat Aircraft and Intermediate Jet Trainer that set the platform for growth in the field. The demand for software and hardware for these set the base for aerospace industry to grow.

Could you give an overview of your operations?

We are a well recognized group in the sector. We are well positioned to exploit the opportunities in the growing aerospace market. At present we have about 1500 engineers employed in aerospace and defence sectors. Almost 25 p.c. of our staff are working abroad. After the acquisition of two companies in Australia we are in a stronger position. The manufacturing centre in Bangalore will be operational within a few months. We focus on design services, interiors, structures and avionics. We undertake complex work packages. Our growth is on par with the growth in the sector. Our

aim is to become a well recognized design and build player within three to five years. We plan to invest more, to invest in certain programmes.

What, according to you, are your major strengths?

Technically, we are strong in structures. We are also strong in interiors after having worked with many OEMs. We are also putting in lot of efforts in avionics.

Could you discuss your business model in terms of flexibility of partnership-focused customized services?

We are working on a flexible business model. There is T and M model and Fixed bid model. As it is a long-term business we are also looking at risk-sharing models. We want to consolidate our gains through acquisition and partnerships. Partnerships help us to improve our capabilities through learning from the best practices.

Could you throw light on your engagements with leading aerospace and defence companies?

We supply A to Z to five of the eight leading OEMs. We have a long association with EADS and involved in strategic engagements with Airbus. We are doing fuselage design for one of the OEMs. This shows our maturity.

Europe is a focus area for Mahindra Satyam. What are the advantages in

having a strong presence in Europe?

Europe offers very big opportunities with new design and development programmes. We have made a conscious decision to set up delivery centres near our customers' base as they prefer to have facilities closer to them. We have one at Hamburg and another at Toulouse. We want to strengthen relationships with regional aerospace businesses. We benefit by acquiring skills in areas where we are deficient. For example there is a scarcity of resources in design and stress.

What happened to your plan to acquire an aerospace engineering firm in Europe?

We are actively looking for acquisitions to consolidate our gains. Talks are in an advanced state. We are hopeful of clinching the deal soon.

Which segment of your business does generate more revenue?

That I can't say. But I can point out areas generating more opportunities. These are structures, engines, interiors and MROs. Offset opportunities are huge.

Could you throw light on your business model in terms of flexibility and partnership focused customized services?

In certain areas we need to improve. For instance Indian capability is very limited in conceptual design of a commercial aircraft. Partnership helps in building

capabilities. It provides the right kind of subject matter experts. We may be good in certain area and the partner may be good in some other area. Together we are better placed to enter the market. Some of our customers are operating from our own campus.

How about your alliances and joint research and development initiatives with the academia?

We are involved with Indian Institute of Science along with a customer on a programme of CFD and wind tunnel testing. Another one involving IISc is structural health monitoring programme. We are attracting talent through an innovative young engineer award that has become very popular with engineering students.

We pick top ten after a rigorous selection process involving three-four stages with in-house experts and subject matter experts from the academic field.

We invite papers from the candidates and provide opportunity to prove their talent. We offer placements to the five toppers. Next we want to move on a global scale to spot talent.

We are constantly in touch with academic field in finding ways to upgrade curricula to suit the changing needs of the industry. For fresh engineering recruits we have a six-month training programme involving engineering colleges.

Could you comment on Karnataka government's plan to make the state a global aerospace hub to attract \$4 billion-investment by 2017?

There is no dearth of opportunities. What matters is the creation of the right environment and the right infrastructure. The only problem may be getting the right talent to exploit the opportunities.

What are the new opportunities that

you foresee for the private sector in defence? Is your company well placed to exploit it?

The key is to accelerate the public-private partnership. The new acquisition of aircraft for IAF like MMRC, C-130J and other planes can generate plenty of opportunities for private players. The potential of offset programmes is immense. We will be happy to contribute to national programmes to meet the timeline. We can also bring in new practices that we have learnt. This can benefit India in the long run.

Could you comment on C-NM5 programme?

It is the first public-private programme of this kind involving an Indian company. The flight testing of the five-seater plane is going on in Australia. I feel in one to one-and-a-half years the project will be completed successfully.

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Keen to grow aerospace biz team in India: Atkins



Han van der Vleuten
Atkins' Aerospace Operations
Director in India

Atkins Aerospace is seeing more and more large-scale, technically-challenging engineering projects in the market, and the company excels at this type of work because it has the size, strength and breadth of capability to work on major multi-disciplinary projects, says Han van der Vleuten, Atkins' Aerospace Operations Director in India, in this interview to Aeromag Asia.

Could you talk about the company's operations in India?

Atkins is one of the world's leading design, engineering and project management consultancies, and we have had operations in India for over 15 years. In Bangalore we currently have a team of around 1000 engineers working across a range of sectors including building design, water, environment, highways, energy, rail, ICT systems and aerospace.

How do you see India as a market for your business?

It's an exciting time to be working in engineering in India. We are seeing more and more large-scale, technically-challenging engineering projects in the market, and Atkins excels at this type of work because we have the size, strength and breadth of capability to work on major multi-disciplinary projects.

In addition to this, India is an international centre of engineering excellence, producing tens of thousands of engineering graduates every year. So for Atkins it's important to have operations here in India to ensure we are employing the very best engineering talent.

Could you elaborate on your strategy vis-a-vis opportunities in the aerospace and aviation fields in India?

At the moment the priority for our aerospace business in India is growing our team, and we've recently been holding a series of aerospace engineering recruitment days to help us tell more people about what makes Atkins a great place to work. The team in Bangalore supports project work all around the world, providing high quality design and analysis for major clients such as Airbus and Rolls-Royce, and there is increasing demand for their skills.

In aviation more broadly, Atkins is developing its software verification and validation business. Aviation is a sector where safety is absolutely critical and Atkins has many years' experience of independently verifying safety critical software systems, such as those used in aircraft avionics. Alongside this, the Atkins team in India is also working on biometric security systems for major international airports.

What's your short-, medium- and long-term goals in India?

We have had a 40% increase in the size of our aerospace team here in the last year and our short and medium term goals are to continue to grow. We're looking for talented and motivated engineers, and in return we offer them the chance to work in a growing, international business that is committed to their professional development, alongside a friendly and supportive team, and to work on some of the world's most exciting aircraft development programmes.

Our clients know us as a team that is able to tackle particularly challenging pieces of engineering work, and for delivering on time and to budget. The long-term goal must always be to maintain this and to continue to focus on being the best in our field.

What are your thoughts on and expectations from Aero India 2013?

Aero India is a great event, which brings together the best of our industry in terms of people, products and technology; it provides opportunity for our employees to get close to the products they work on and see them in action. We are not exhibiting this year but will be present to enjoy the event and meet others in the industry.

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Airbus eyes mega avro replacement contract in India

Airbus Military's first priority is to conclude the financial negotiations relating to the A330 MRTT satisfactorily in India and put a firm contract in place. It is also expecting to see a request for proposals for the Avro replacement in the fairly near future, says Ian Elliott, VP Defence Capability Marketing, Airbus Military, in this interview to Aeromag Asia.

irbus Military is the winner in the Indian Air Force's tender for six new generation flight refuelling aircraft (RFA). How significant is the contract in furthering your business in India?

The selection of the A330 MRTT by the Indian Air Force is an extremely important step for our activity in India. Not only is it a substantial deal in its own right that is being negotiated, but it will be our first military sale in India. We are very confident that we will fully satisfy the IAF once the aircraft enters service and we have an excellent record of securing additional business in countries that operate our aircraft. This transaction also gives us the opportunity to embark upon projects with Indian industry as part of the offset requirements, and we are sure that the relationships that we form in that respect will put us in a strong position to build on this first deal with further contracts.

What is your target in garnering business in India, say in the next ten years?

Obviously our first priority is to conclude the financial negotiations relating to the A330 MRTT satisfactorily and put a firm contract in place. We hope that can be achieved in a sensible timescale. In parallel with that we expect to see a request for proposals for the Avro replacement in the fairly near future. It is a large requirement for that class of aircraft, replacing 56 Avros, and we are very sure that the C295 would be superb in the role,

so of course we will be keenly following that programme. Then there are other less well-defined requirements, possibly transports for other state agencies, and perhaps the medium-range maritime reconnaissance aircraft, for which we would also offer the C295 as it is very well proven in the maritime patrol world as well. And in the longer term we firmly believe that the A400M has a role to play in the IAF with its unique capabilities as a transport with strategic range and speed, married to true tactical capabilities. So, when we look out ten years, we see ourselves having a steadily strengthening relationship with India.

What is the latest update on A400M project?

The A400M is at a very exciting point because we are in the final countdown to the first delivery to the French Air Force. That will take place in the second quarter of this year and is the culmination of all the years of work that have gone into the aircraft, and particularly the last three years covering nearly 4,500 hours of flight testing so far. We recently completed the 300 hours of what is called Function & Reliability (F&R) testing, which was the last major test activity required, and now we are working with the civil and military certification authorities to achieve the dual certification before the end of March. At the same time we are beginning to step up activity related to training in line with the aircraft schedule and very shortly the first A400M full-flight simulator will be installed at the International Training

Centre in Seville, as well as a range of computer-based training devices for specific aircraft functions, and a full-size cargo hold trainer.

Altogether in 2013 we will deliver four aircraft, exactly as always planned – three to France, and the first for Turkey. The first of those has already appeared in French Air Force colours and the others are at advanced stages of construction. The major modules of another 13 aircraft are in production in the different Airbus plants around Europe, and will eventually be transported to the Final Assembly Line in Seville, and long-lead items have been launched all the way to aircraft MSN28. So the programme is very much in transition from a developmental phase to the production phase and we are delighted with the rate of progress.

Airbus Military is on an overdrive to boost exports now. Is it prompted by project delays?

In the case of the A330 MRTT and C295, we have been very energetically selling them around the world ever since launch. Last year was extremely successful for the C295 and CN235 – we sold 32 aircraft in eight countries, which is one of the best years ever for that category. And in fact we have just started 2013 with the sale of six C295s to Egypt. Of course the A330 MRTT has now been selected by India to add to Australia, Saudi Arabia, UAE and UK, and there is an important competition underway in Singapore, so we have never stopped pushing the A330 MRTT wherever there is a tanker requirement.

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“We anticipate high growth in near future”



Anup VITTAL
MD, Safran Engineering Services
India Pvt Ltd

With recent developments of global increase in engineering activities and also with burgeoning domestic business opportunities, the future looks very promising, says Safran Engineering Services India Ltd. The company is well positioned for strong growth both in terms of headcount and revenues, says Mr Anup VITTAL, Managing Director of Safran Engineering Services India Pvt Ltd, Bangalore, in this interview to Aeromag Asia.

Could you talk about Safran Engineering Services India?

Safran Engineering Services India (SESI) is a part of the Safran Group, a global high-technology group focused on Aerospace, Defense and Security. Head Quartered in Paris, France, the Safran Group had approximately Euros 12 Billion in Revenues last year and 60,000 employees worldwide. Safran Group companies include well known names like Snecma, Turbomeca, Messier-Bugatti-Dowty, Labinal, Sagem, Morpho etc.

In India, the Safran Group is present through various subsidiaries and Joint ventures. SESI, based in Bangalore is Safran's exclusive engineering services provider and caters to the requirements of the group companies as well as other aerospace customers. More than 550 employees strong, SESI showcases the Safran Group's expertise in Aero-structures, Electrical Systems, Mechanical Systems, Technical Documentation, Embedded Software, Systems Engineering, Electronics and Engineering Software.

Your journey so far and the road-map you see in the near-term?

The company is one of the early entrants

in the Engineering Services domain. Starting operations in 2002 SESI quickly established itself as one of the leading players in the industry. The company was incorporated as Snecma Aerospace India and was renamed as Safran Aerospace India when the Snecma group merged with Sagem to form the Safran group. Owing to the fact that the company provides solutions in Engineering Services beyond Aerospace domain, it has been renamed as Safran Engineering Services India. Today we are one of the few companies that offer the entire gamut of solutions in the Engineering Services domain under one umbrella.

How has your Indian business benefited your parent company?

SESI's operations are designed on an integrated business model of our parent company Labinal, which is one of the Safran Group companies. This model is flexible enough to operate at a global level as well as at domestic level (India based business opportunities). Through our parent company, we are operationally responsible for Safran Group's strategic objectives and contribute directly to the business of the company and the group. The group's goals flow down to SESI, and we have been exceeding them on a

consistent basis.

We are also an integral part of Safran's growth strategy for emerging markets, both in terms of technology transfer and for fulfilling various requirements like Offsets. With many of the Safran Group companies involved (directly or indirectly) in Aerospace, Defense and Security business opportunities in India, SESI will have a prominent role to play in this area.

From the service offerings perspective, SESI has a unique advantage of providing a wide spectrum of engineering solutions to its customers. As mentioned earlier, SESI has expertise in Aero-structures, Electrical Systems, Mechanical Systems, Technical Documentation, Embedded Software, Systems Engineering, Electronics and Engineering Software. For any company seeking to outsource work to India, we can be a one stop solution provider with cost-effective value propositions. Availability of competent talent with a significant cost benefit is the primary advantage that we offer to our customers. Over the years we have managed to enhance customer confidence through on time delivery with desired Quality and Productivity.

What are the ramp-up and expansion plans in Bangalore / India?

With recent developments of global

Flying in comfort with maxon motors

At an altitude of 11 km above the surface of the earth, the air is very thin. Modern pressure cabins and an environmental control system (ECS) ensure a pleasant atmosphere in commercial aircraft. In the new Boeing 787, also known as the Dreamliner, a special air-conditioning system further improves the comfort of the passengers on long flights. Brushless maxon DC motors, spur gear heads and resolver combinations ensure a good climate at great heights.

Environmental control systems in aircraft encompass three components: air exchange, pressure control and temperature control. At altitudes up to and beyond 11,000 metres, providing the passengers with the required atmosphere in the cabin, with high enough air pressure, adequate oxygen supply and a satisfactory ambient temperature, means that each commercial aircraft needs a climate control system. Air-conditioning systems in aircraft therefore differ greatly from ordinary air-conditioning systems, both where the design and the energy source are concerned, as aircraft ACs require an energy source with much higher power capacity and have to meet higher safety requirements.

Pressurized cabins in commercial vehicles ensure that the air pressure is at

a level that is tolerable for passengers. The circumference of the aircraft expands due to the pressure compensation. This puts great stress on the airframe. During the flight, the pressure in the cabin is successively reduced slightly as the altitude increases. Thus the passengers experience an amplitude increase to approx. 2400 metres. However, the climate control also depends on the amount of oxygen required by a human and the number of seats on the aircraft.

But oxygen alone does not ensure a pleasant atmosphere. The temperature and humidity also play an important role. Modern computer-controlled systems regulate the temperature with a precision of one degree. A considerable amount of heat is contributed by the passengers themselves. Each person radiates 80 to 100 W on average. On the ground, the air-conditioning unit is supplied with compressed air by the auxiliary power unit (APU) and during the flight, on most aircraft, by the jet engines.

On the Boeing 787, the air is not drawn from the jet engines under pressure, but is instead, fresh air from the outside atmosphere. On board electric motors power compressors to prepare the cabin air for a comfortable flight experience. In other words, the air-

conditioning system is operated entirely electrically. The jet engines have very strong generators to ensure adequate power supply. The climate system for the Dreamliner is manufactured by the American AC manufacturer Hamilton Sundstrand. Such a system supplies enough power to cool or warm 25 private households.

Motors for aeronautic and astronautic applications differ greatly from standard motors. They have to withstand greater temperatures and vibrations, have a longer life span and have to be very reliable. All in all, 48 motors by maxon are at work in the climate control system of each Boeing 787. Specific motor modifications were required for the highly complex air-conditioning system. This includes drives for the cabin ventilation, for cooling the electronics and for closing and opening the air inlet on the outside of the aircraft. The motors have to withstand temperatures of -55°C to +85°C and the vibrations during take-off and landing throughout the decades of the aircraft's service life.

Therefore it is vital that the motors have a long life span. The cabin ventilation system consists of 36 shut-off valves that are driven by maxon EC 45 flat motors. These light brushless motors have been designed to fit into even the smallest spaces.

increase in engineering activities and also with burgeoning domestic business opportunities, the future looks very promising, and we are well positioned for strong growth both in terms of headcount and revenues. SESI has maintained a growth rate which not only supports the short term requirements but is also sustainable in the long run. We anticipate high growth in the near future and are constantly evaluating work locations to determine an appropriate fit for our business objectives. The priority would be to provide a congenial work environment to employees, while at the same time meeting business objectives including operational efficiency and profitability.

What are the Future Prospects of SESI and could you talk about your vision over long-term?

SESI is well positioned to take advantage of the growing shift of global engineering to locations like India. Today

it has built up significant competencies, capabilities and capacity in many domains and technologies – All of which are 'hot' requirements today and into the foreseeable future. Safran Group strategy also aligns very well with SESI objectives, with the expected gains from Offshoring as the global economy shrinks, and continued focus on on-time delivery and quality of services rendered.

We foresee strong growth in the next few years, as we move further up the value chain in our core domains and service offerings. Specifically, we have a high potential for business from Aerospace customers (both within the Safran Group and outside), Defense customers (domestic direct opportunities in India, as well as collaboration expected around Offsets), and also Security customers where Safran and SESI are already involved. We are continually evaluating new business opportunities to expand our customer base both in India and in global markets.

We will be laying special emphasis on growing relevant skills & competencies in the teams, especially in the Aerospace domain. A significant outcome of this plan is the establishment of a Competency Development Centre in the organization, and also developing a University Interaction program. Together, these aim at increasing the quantity and quality of the available talent pool in the industry, and their availability for industrial projects. The university interaction program especially focuses at nurturing the best talent from universities, development of curriculum to suit aerospace industry and leveraging the University infrastructure and capabilities to develop new methods on new technologies.

Safran Engineering Services India is today positioned in a 'sweet spot' for business, as we seek to leverage our decade-old story of growth in India and take on new business opportunities in India and globally, for Safran Group as well as other customers.

Karnataka Soaring hopes on aerospace boom



Jagadish Shettar
Hon'ble Chief Minister of Karnataka

Being a dynamic state in promoting industrial development and as an emerging manufacturing powerhouse, Karnataka has launched a mission to make the state a global aerospace hub by providing world class infrastructure to prospective investors. After witnessing a runaway growth in IT sector the state is striving to present itself as the preferred investment destination for major aerospace players. The new aerospace policy with a lot of incentives for investors if implemented in letter and spirit can do wonders.

Karnataka government is set to announce a dedicated aerospace policy, a first in India, to attract global aerospace giants in a big way. A path-breaking policy valid for ten years is intended to attract massive global investment of about Rs.50,000 cr. making Bangalore a global aerospace hub. Besides contributing substantially to the economy of the state, aerospace industry is expected to generate jobs for about a lakh of people during the ten-year period. The state government has drawn on the inherent strength of the state as the knowledge capital and the presence of HAL and many allied defence units here for formulating the ambitious policy. It had also taken inputs from all stakeholders in the

aerospace sector.

Other main objectives of the policy are to make Karnataka a preferred global destination for manufacturing of aircraft, aircraft systems and sub-systems, assemblies and components. It is aimed at making Bangalore a preferred destination for global Tier-I suppliers and promote the state as one of the leading MRO hubs in Asia. Karnataka has stolen a march over other states as home to India's aerospace industry. It all began in 1940, with India's premier aerospace establishment, Hindustan Aeronautics Limited (HAL) starting operations in Bangalore. Other public sector undertakings like Bharat

Electronics Limited, NAL, DRDO, ADA, ADE, ISRO among others are also located in the city. In 2009, Boeing launched a research and technology unit in Bangalore to collaborate with Indian research and development organizations. Airbus manufacturer EADS also started research operations in Bangalore in with the establishment of an innovation unit.

Strong base

"Karnataka intends to take advantage of the promising scenario and strive to project the state as the aerospace hub for Asia in the next five years and as one of the top global aerospace and MRO destinations by 2022," the draft Aerospace

Thumbs up to Karnataka

PricewaterhouseCoopers-CII study titled 'Karnataka- Aerospace hub of India' in 2011, noted that Karnataka has positioned itself as an aerospace destination, with several education, scientific and technical educational institutions that firms could leverage.

The study gives a perspective on Karnataka's strength and potential in aerospace industry to attract foreign investment and emerge as a global destination in aerospace manufacturing, MRO and engineering design and R&D sector. The report favourably notes the strides made by Karnataka in industry with proactive government policies. In the backdrop of the state being the IT capital of India with an abundance of trained technical manpower, presence of many aerospace related industries, lead in heavy manufacturing and many technical, scientific and research institutions give Karnataka a headstart in wooing investors in aerospace. The report also commends the investor-friendly government's actions in creating the right business environment for international investors. Bangalore operates one of India's busiest airports as reported in the CII report entitled Vision 2015—Karnataka: A Global Aerospace

Hub. As such, there is tremendous potential for activities in MRO and ground handling, and the manufacture of ground support equipment.

"Bangalore has a location advantage in terms of talent availability in IT, engineering and aerospace, proximity to industrial hubs like Pune, Hyderabad and Chennai, and connectivity to road, rail and air.

- Fairly peaceful multi-cultural State that embraces different cultures.

- Favorable climate, congenial environment for private investors, cosmopolitan lifestyle, excellent health care and education facilities."

The study estimates that global aerospace sales may reach \$ 2 trillion over the next 20 years. The Asia Pacific region is deemed to be the fastest-growing Aerospace region in the next 20 years with the fleet size expected to triple by 2025. It also notes the increasing trend among OEMs to concentrate on their core competencies in design, integration and assembly. The downtrend if any can be offset by the growing expenditure in defence.

"The global recession and significant margin pressures will continue to force global OEM and Tier-1 suppliers to undertake major restructuring and cost



Murugesh R Nirani
Hon'ble Minister for Large and Medium Industries

Policy document said. The policy has been formulated through wide-ranging consultations with all stake holders including industry associations, trade bodies and government departments concerned. The Aerospace Core Group committee constituted by the government of Karnataka also discussed the policy framework. The Confederation

cutting exercises. Emerging economies which provide significant cost benefits are increasingly being considered as an outsourcing destination for manufacturing-related work. Karnataka could benefit from this trend with offset obligations acting as a catalyst. Efforts by domestic suppliers to move up the value chain will also encourage foreign companies to outsource more manufacturing related work, rather than only systems and low value IT assignments. In addition, the globalization of MRO services, manpower cost competitiveness, the availability of talent, locational advantages combine to make Karnataka a potential regional MRO hub."

Technological Issues

"Karnataka needs to keep pace with the increasingly high use of technology across the design lifecycle. Foreign companies may be reluctant to transfer cutting-edge technologies with limited management control to Indian entities. These will have to be leveraged through offsets and by increasing the FDI cap on defence manufacture.

In addition, the composition of materials used in aircraft manufacturing is migrating towards new advanced materials. Currently, almost all raw materials are being imported

of Indian Industry (CII) and PwC offered suggestions.

The preamble of the draft aerospace policy says: "India's Aerospace & Defence (A&D) sector is at an inflection point. Various estimates put the A&D expenditure on acquisitions at around Rs. 5 lakh crores (US \$ 100 Billion) over the next 10 years.

The robust growth potential of the industry is attracting OEMs in Aerospace sector to set up shop in India thereby providing tremendous opportunities for Indian industry participation. Defence Procurement Policy (DPP-2011) has included civil aviation

equipment in the list of direct offsets. By 2017, the Indian aviation market is projected to be among the three largest markets globally."

Salient features of Aerospace Policy

i) Envisioned to position Karnataka as a Vibrant Aerospace Hub of Asia and a globally recognised aerospace destination.

by Indian suppliers. In the field of advanced materials, novel processing and material characterization methodologies are still emerging and will take time before the State becomes self reliant."

Future Prospects

OEMs and Tier 1 suppliers will be looking ahead to establish customer support centers for stocking spare parts, avionics repair workshops, logistic centers to optimize supply chain management, training centers for training of technicians, engineers, managers and innovation centers besides alliances for manufacturing of sub assemblies. Karnataka, due to the several advantages it boasts of, can be a hub for such aerospace activities. The offset policy, defence or civil, should also allow these to qualify as offset obligations.

India's offset policy, which prescribes 30% of all deals above 300 Crores to be reinvested into the country, is obliging aerospace partners to set up subsidiaries, enter into joint ventures or outsource design, components, sub-systems, accessories to the Indian aviation industry. Offsets can thus play the role of a catalyst in development of aerospace MRO and manufacturing activity by providing an added incentive to global aerospace majors and their suppliers.

ii) Has a mission to attract investments of Rs. 60,000 crores (\$10 billion) over a period of 10 years in two phases i.e. 2012-17 and 2017-2022 and generating direct employment for about one lakh persons and derive large spin off effects.

iii) To create Aerospace Eco-system across the State by providing enabling and industry-friendly environment.

Its vision is "to position Karnataka as a vibrant aerospace hub of Asia and a globally recognised aerospace destination by creating enabling environment for holistic and sustained growth of the Aerospace Sector.

Policy has a mission to achieve substantial progress in the Aerospace Sector as envisaged below:

Phase-I (2012-17)

1. Attract investments to the tune of \$ 4 Billion in Aerospace Sector.
2. Provide additional employment to 40,000 persons in the next five years.
3. Increase the contribution of Aerospace sector towards enhancing the share of industry in the State's GDP from 28% to 30%.

Phase-II (2017-22)

1. Attract investments to the tune of \$ 6 billion in the Aerospace Sector.
2. Provide additional employment to 60,000 persons in the next five years.
3. Enhance the contribution of Aerospace sector towards increasing the share of industry in the State's GDP from 30% to 32%.

Objectives

- a) To make Karnataka a preferred global destination for manufacturing of aircraft, aircraft systems & sub-systems, assemblies and components.
- b) To create of eco-system comprising infrastructure, education and R&D to make the State a conducive hot spot for aerospace industry.
- c) To make Bangalore a magnet for global tier-1 suppliers.
- d) To make Karnataka one of the leading MRO hubs in Asia.
- e) To make available ready to-employ human resource pool for the industry.
- f) To strengthen R&D infrastructure for achieving innovative and cutting edge technologies.
- g) To create enhanced facilitation mechanism for ease of doing business through industry friendly policy frame work.

The strategy includes:

Creation of aerospace eco-system

- Development of state-of-the-art infrastructure conducive for industries, research and capacity building.
- Develop well balanced aerospace industrialization across the state through a process of inclusion.
- Assist in developing Micro, Small, Medium and Large scale industries equally in Aerospace sector.
- Encourage private sector participation on a transparent basis in development and operation and maintenance of aerospace infrastructure.

Development of Aerospace Manufacturing, MSME & MRO sectors, Boosting exports by creating brand image of Karnataka as a quality manufacturing Destination, Harnessing Human Resources and Focus on R&D.

Aerospace Park

One of the key aspects of the aerospace policy is operationalization of

Bangalore Aerospace Park (BAP) and Bangalore Aerospace SEZ (BASEZ) being established by the Government at Devanahalli within a year by providing required infrastructure. The Joint Aerospace Task Force shall monitor the progress. This park will be established, maintained and managed through a Special Purpose Vehicle to be constituted with members from Government, industry and professional bodies. These parks will have the following facilities when completed:

- Manufacturing area and SEZ.
- MRO with a direct access to the BIAL runway
- Testing centre.
- Hardware / embedded technology centre.
- Technology innovation centre including a certification / calibration centre.
- Housing.

The state government has already earmarked 1,000 acres for Bangalore Aerospace SEZ and Park. Already, land has been allotted to 27 companies including HAL, BEML, and Dynamatic Technologies. Aerospace giants like Boeing, Airbus, Bombardier and Embraer have shown interest to take up space for setting up their India facilities in Bangalore. The park has potential to emerge as an aerospace industry cluster with an ecosystem to generate direct jobs to 242,000



M. N. Vidya Shankar
Principal Secretary
Commerce & Industries
Department

people and house domestic and overseas firms in an integrated space with required infrastructure facilities.

Mr. Murugesh R. Nirani, Minister for Large and Medium Industries, had told Aeromag Asia after the Global Investors' meet that he didn't foresee any hurdles to the Aerospace Park project. He said: "Initially there were some problems related to land acquisition. Only the compensation pertaining to 120 acres due to doubtful ownership is pending. The rest of the land has been taken possession of. Now work is in full swing and I am hundred per cent confident the aerospace park will become operational as per schedule." On the progress on Aerospace Park, Principal Secretary M.N. Vidyashankar recently

said three units were almost ready. "About seven to eight companies have already started construction," he added. Karnataka expects close to about \$6-7 billion with every major aviation player under one roof at the aerospace park.

Infrastructure

Infrastructure is a pre-requisite for sustained economic growth. Karnataka's vision is to "Build strong public-private-partnership in infrastructure to achieve the twin objectives of growth and equity." The Government will give prime focus on creation of world class infrastructure for aerospace sector. It is proposed to establish Aerospace Parks at potential locations like Mysore, Hubli, Mangalore and Belgaum in phases depending on the demand from industry. These parks will have comprehensive infrastructure facilities like road, captive power generation, water supply, facilities for R&D/testing, finishing schools, housing and health care for employees enabling the units to operate on 'plug and play' concept. Development of such parks would be encouraged through PPP model.

In addition to manufacturing, it is proposed to create a world class Maintenance Repair and Overhaul (MRO) Facility in Bangalore. It is also proposed to set up a MRO facility at Mysore on a PPP mode. It is proposed to develop Greenfield airports at Shimoga, Bijapur,



Maheshwar Rao
Commissioner of
Industrial Development

Hassan and Gulbarga through the PPP model. These will be "No-Frill Low-Cost Airports" with investments ranging from Rs.40 crores to Rs.100 crores in a bid to provide air link to small towns suitable for operation of small jets as well as Boeing 737.

The defence airport at Bidar and Karwar will be opened for civil aircraft. Additionally, the State plans to develop airstrips and helipads at all district headquarters and important industrial destinations which do not have air connectivity. Air strips will be constructed at Davanagere, Chickmagalur, Udupi, Madikeri, Gokarna, Chitradurga, Bagalkot, Haveri, Gadag and Kollegal. The above will

open up opportunities for developing aerospace activities in tier-2 cities. The proposal is to develop the aerospace industry through a cluster approach. The cluster approach envisages inclusion of enterprises, financial providers, suppliers, service providers, common facilities such as testing laboratory at potential locations of the State.

Support to MSMEs

MSMEs have potential to form the backbone of the global aerospace supply chain. It is proposed to enhance support to MSMEs in the aerospace industry with the aim of making them globally competitive. MSMEs in the aerospace sector shall have preference in allotment of land in designated Aerospace Parks. At least 30% to 40% of the land in Aerospace Park will be reserved for MSMEs.

Establishment of specialized training & finishing institutions at potential locations by private sector or in PPP mode will be encouraged by providing financial support. It is proposed to allot 5 acres of land in notified industrial land to these institutions at concessional rates. These institutes are expected to

impart training to about 5000 persons annually, which can be easily absorbed by the industry. In-plant training provided by industries will also be encouraged by way of stipend to the trainees.

The State will try to commission the 'Karnataka Aerospace Research & Innovation Centre' in Karnataka. The Government will give it necessary support to make it a world class aerospace research hub. It will have a state of the art laboratory along with an incubation centre for budding Aerospace engineers and entrepreneurs and will be constructed on a PPP model with the state funding up to 50% of the cost.

Karnataka also proposes to establish a new Aerospace University in the state in association with a suitable knowledge partner. It is also proposed to have a flying training school to be located within the campus. The university and the flying school will be set up as a joint venture between the state and interested investors. It is also proposed to infuse capital into innovative ventures by creating an Aerospace Venture Capital Fund with a corpus of Rs 200 crore with participation of government (to the extent of Rs 50 crore), financial institutions and other investors.

Incentives

To attract investments in Aerospace sector and also to provide level playing field to the industries, enhanced package of incentives and concessions will be offered by the Government. These incentives shall be within the broad guidelines of the incentives and concessions offered in the Karnataka Industrial Policy 2009-14. Some of the additional incentives will be offered to the sector over and above the incentives offered in Industrial Policy 2009-14.

While the goals of the government are commendable there is a big question mark on the implementation of the policy initiatives due to various adverse factors. The state is passing through a fluid political situation creating uncertainty on major initiatives. The development process is hindered by policy paralysis displayed at various levels of administration. An indication of the state of affairs is the lukewarm response to the Global Investors' Meet held six months ago. The government will have to strain every nerve to win back investors' confidence to make policy initiatives meaningful.

Karnataka's strengths

- It is a preferred choice for global players in the Aerospace research and development space.
- Extensive experience and inherent competencies in aerospace make Karnataka the producer of more than a quarter of India's aircraft and spacecraft.
- Global giants such as Boeing Research & Technology Center and Airbus Engineering Centre have made Karnataka their base.
- Karnataka has India's first and top R&D Centres in Aerospace & Defence such as Indian Space Research Organisation (ISRO) and the Defence Research and Development Organisation (DRDO).
- Boeing Research & Technology Center, Airbus Engineering Centre, and DRDO's Gas Turbine Research Establishment (GTRE) are all located in Bangalore.
- The Government of Karnataka has earmarked 984 acres of exclusive industrial area and sector specific SEZ for Aerospace industries near Bangalore International Airport.
- India's first Aerospace SEZ is operational in Belgaum.

SARAS PT1N to fly in February: NAL

CEMILAC and DGAQA who have joined the SARAS programme about a year ago are providing very good regulatory support. NAL expects the PT1N to fly by the end of February 2013. The work on weight optimised version of SARAS (PT3) will be resumed shortly, says NAL Director Shyam Shetty in this interview to Aeromag Asia.



Shyam Chetty
Director, NAL

What's the update on the SARAS project, and what are the things you plan to do in this context in the near term?

The SARAS PT1 is being upgraded to PT1N standard which includes modified stubwing and rear fuselage, larger area rudder, new nacelle and an autopilot. PT1N will be powered by 2 x 1200 SHP PT6A-67A engines. CEMILAC and DGAQA who have joined the SARAS programme, about a year ago, are providing very good regulatory support in this connection. We expect that the PT1N will fly by end of February 2013. The work on weight optimised version of SARAS (PT3) will be resumed shortly. The composite components like the wing, HT, VT are getting ready and we are confident that the PT3 aircraft will fly by last quarter of 2013.

What's the latest on Hansa?

We are expecting DGCA approval to CSIR-NAL for the operation of HANSA aircraft under the new CAR-21 regulations being implemented by them. It is now planned to fly HANSA aircraft under the experimental category. In the meanwhile, IIT-Kanpur has started flying HANSA again for their flight research activities after installing a new engine with the support provided by CSIR-NAL. IIT-Kanpur has expressed interest to procure one more HANSA aircraft to meet

the demands of student flight training and flight research activities. CSIR-NAL has identified an aircraft to be provided to the Institute, this will be delivered after completing certain formalities, very shortly.

The Banasthali Vidyapith Gliding and Flying School (BVGFS) in Rajasthan had requested for an allotment of one HANSA aircraft to DGCA and they have since agreed to this request and allotted the HANSA aircraft that was available with HICA Flying club in Karnal (Haryana). This aircraft was dismantled and re-assembled at BVGFS with the assistance of CSIR-NAL. We also provide all the assistance required by the Banasthali School to operate this aircraft including training for the maintenance crew and the flight crew.

What are the other key programmes in progress at NAL?

The other key programmes at CSIR-NAL are related to design & development of 5 seat general civil aircraft CNM-5 jointly with Mahindra Aerospace (MAPL), development of fly by wire flight control laws and supply of complex 13 composite components/assemblies for the series production requirements of LCA Tejas.

CSIR-NAL and MAPL, the industry partner in the CNM-5 programme collectively decided to take up the task of certifying the aircraft in Australia as MAPL had acquired M/s. Gippsland Aero in Australia, which is now their sister concern. They have the design and production approval by CASA, the local regulatory authority. Therefore, both the partners will pursue this programme in Australia with CSIR-NAL providing design, structural testing and flight instrumentation support and MAPL-Gipps Aero taking up the responsibility for prototype aircraft manufacture and flight testing in Australia. A tripartite meeting of CASA, CSIR-NAL and MAPL will be held in March 2013 in Australia to decide on the follow up action required. The first prototype aircraft which is currently undergoing flight trials in Australia will continue to fly till about September this year, during which time all the modifications required to make the aircraft fit for certification will be carried out. A formal application to CASA for certification is expected to be made by then and a final certification by CASA is planned by end 2014, in Australia.

As it is well known CSIR-NAL is leading



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the National Team effort on Design, Development and Certification of Fly-by-wire Flight Control Laws and Fault Tolerant Airdata Algorithms for all Air force and Naval variants of Tejas. Over 1990 successful flights have been flown on twelve different prototypes. The IOC version of the Control Laws include an autopilot, boundary limiting and carefree manoeuvring features. The autopilot performance was rated on par with the any flying autopilot in the IAF fighter fleet by the NFTC test pilots. Air Data algorithms have been upgraded to improve the robustness and also incorporates wake protection features. The National Control Law team has also developed robust and efficient "hands-free" ramp take off mode for LCA Navy, which will reduce the specialised training required for ship borne operation by naval pilots. An auto throttle control law has been designed and is undergoing the piloted assessment in the simulators. Ship dynamics model for indigenous aircraft carrier has been configured and is being integrated with the aircraft simulator. Wake penetration trials have been carried out to validate the wake models used in simulation and to obtain the necessary clearances.

CSIR-NAL has the responsibility of supplying 13 large and very complex composite airframe components/assemblies for the series production requirements of LCA Tejas. These include Centre Fuselage components (7 Nos.), Under-carriage doors - Forward and Aft (4 Nos.) and the vertical Fin and Rudder assembly for 20 airframes. To meet the above requirements, TATA Advanced Materials Ltd (TAML), Bangalore, has been identified as the production partner and CSIR NAL has entered into a MoU with TAML. The manufacturing technologies developed in fabricating the above components have been brought up to the production standards. TAML team is undergoing training on the fabrication of the above components at the Advanced Composite Division of our laboratory.

Could you talk about MAV programmes?

CSIR-NAL is playing a lead role jointly with IIT-Mumbai, IIT-Kanpur, Indian Institute of Science and a few other academic institutions and private industries in the National Programme on Micro Air Vehicles (NP-MICAV) of DRDO and DST. At NAL we have newly formed a MAV unit which has completed one year and has shown considerable progress. Many sponsored projects are being executed in the unit.



India's Largest Autoclave for Airworthy Composites Processing

Black Kite, Golden Hawk and Pushpak MAV's with a 300 mm span, 300 grams weight and endurance of 30 minutes have been developed. The MAVs carry a day light camera and provide an operational range of 2 Kms. These MAVs are currently undergoing user trials.

Under the CSIR's 12th Five Year Plan program on MAV, it is proposed to develop advanced technologies related to airframe aerodynamics at low Reynolds numbers, fabrication techniques, flight simulation, vision aided navigation and a miniature autopilot of 8 gms. This program also proposes the use of a larger mothership to carry and launch these smaller MAVs there by extending the range of the targets.

Any joint ventures or joint initiatives on the anvil?

We have quite a few joint collaborations with defence laboratories, PSUs, and international institutes/organisation on the anvil. The major ones are highlighted here. CSIR-NAL is actively involved in R&D activity in the area of Structural Health Monitoring (SHM) of composites. The efforts are on the anvil to realise a fully on-line structural health monitoring system so as to enable the paradigm shift from 'Periodic maintenance' to a 'Maintenance on demand' philosophy. Leading Aircraft manufacturers like Boeing, Airbus etc. who have visited NAL have expressed keen interest in having a joint collaboration.

A joint collaboration work on "Extension of Aero-database beyond Normal Flight Envelope" has been taken up with De Montfort University, UK. An advanced aerodynamic model of the Generic Tailless Aircraft (GTA) which includes special models for unsteady aerodynamics and rotary coning motion effects in the near-stall and post-stall flight regimes was developed

and integrated with the real-time flight simulation facility at NAL for further studies. We will be shortly signing a MoU with HAL in which non linear flight dynamics modelling and simulation is proposed as an area of important work.

CSIR-NAL has developed Engine Instruments and Crew Alert System (EICAS) and a 3-axes digital autopilot system for its SARAS aircraft. The EICAS is first of its kind in India and has been cleared by DGCA for aircraft integration. The system has the potential for use in other aircraft programmes both in India as well as abroad. Astronautics, USA has shown interest in forming a joint initiative with CSIR NAL for tapping other aircraft markets.

CSIR-NAL has expertise and facilities for laboratory scale processing of NiTi Shape Memory Alloy (SMA) Wires. An MoU has been recently signed with HAL for productionisation of these NiTi SMA wires at their Foundry and Forge Division. Further, a MoU has also been signed with Research & Development Establishment (Engineers), Pune, for joint collaborative work in the development of pseudoelastic NiTi wires and strips with tailor-made properties suitable for fabrication of SMA hybrid composites for damage mitigation application.

CSIR-NAL has successfully completed collaborative project in the area of electromagnetics for ray propagation and RF field simulation inside passenger cabin of large aircraft such as Boeing 787 dreamliner. The project also involved advanced EM characterization of constituent materials inside the passenger cabin. The Boeing highly appreciated the contributions of CSIR-NAL and expressed their interest in future collaborative work on EM characterisation of their aircraft.

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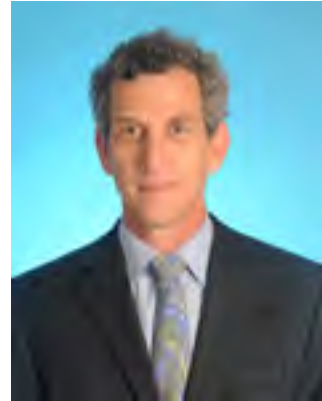
The event attracts total attendances of over 195,000 across the six days of the event. These include exhibitors from the international aerospace industry and government, military, scientific and trade delegates along with leading aviation, aerospace and defence professionals from Australia and around the world.

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Oron Oriol
Executive Vice President,
Business Development & Marketing
Rafael

Rafael's vision combines between the company's historical roots and present activities as Israel's national laboratory, making significant investment in R&D, while continuing to grow financially and boasting substantial presence in the global market, says Executive Vice President Business Development & Marketing Mr. Oron Oriol.

This combination enables Rafael to offer its customers and users in the air, at sea and on land, a wide portfolio of solutions in domains such as defense, attack, command and control etc.

Rafael has created partnerships with companies in Israel and with leading aerospace and defense companies overseas. As such, it holds more than 100 teaming agreements with companies overseas. These agreements bolster Rafael's ability to compete in the global market, synergize its activities with foreign partners and reduce costs. Sharing our knowledge with our partners and facilitating local production gives them a competitive edge and our global customers an economic and operational advantage.

One example of this is Rafael's Spike Family of tactical guided multi-purpose missiles, which have been sold to over 20 countries, in part with local production.

Rafael's wide variety of products, coupled with Israel's frequent regional military challenges generate an exceptional degree of flexibility in adapting Rafael's technologies to the operational requirements of both local and international users.

Changes in modern warfare and the new needs that have arisen from the way modern battles are fought, have brought about new thinking that has led Rafael to take advantage of its long-standing experience and knowhow in missile technology to address the needs of air defense. Throughout the years Rafael has developed many generations of different types of air-to-air missiles, to include the Python-5 and the DERBY, serving also as air defense systems (SPYDER) that are capable of defeating a variety of aerial threats and are already in operational use in a number of countries.

Missile attacks against Israel brought about the

Nitrogen portable charging unit for civilian use

Hale Hamilton's hugely successful and highly acclaimed military nitrogen portable charging unit has now been launched into the non-military sector. The portable Nitrogen 2 Go (N2GO) is now available in the civilian market and is expected to prove every bit as successful as the military version.

First used by the UK Royal Air Force, the portable gaseous ground support equipment is now in daily use with foreign military forces in many countries. The product was originally developed in the mid-2000s as a direct response to a competitive tender from the UK Ministry of Defence Air Support IPT. Hale Hamilton developed a range of all-new portable nitrogen and oxygen charging units, or PCUs, to replace the Hale Hamilton 'walk around' kits that were in service at the time.

The MoD determined that Hale Hamilton's new PCUs best met the pre-determined criteria which included low weight, ease of portability and the provision of both high and low pressure nitrogen outputs. The company supplied 1000 PCUs which remain in service with the UK military across the globe today backed with

a guarantee of ongoing, through-life support that reflects the products quality and integrity, the PCU's.

As a result of the continued success, there had been an increasing demand for a civilian, or non-military, product equivalent. Hale Hamilton has therefore developed the nitrogen PCU and its variants to meet the operation and maintenance needs for most commercial airliners, business jets and helicopters. Now available with the option of wheels, extending handle and a removable lid, Hale Hamilton's N2 Go range of portable

nitrogen charging units leads the field in portable gaseous ground support equipment today.

Trevor Bignold, Hale Hamilton's sales manager, is delighted with the successful development of the company's latest product: "It is easy to carry our PCU out on to the flight line by hand or in a van and with 300bar nitrogen you can top up tyre pressures charge a strut or charge door accumulators. It can also be flown fully-charged, subject to our customer having approval. It really is a handy source of nitrogen on the go. We now call it N2 Go!"

development of "Iron Dome" - a counter short-range rocket system, which since its initial deployment in 2009 has intercepted over 500 rockets that have been fired from the Gaza Strip at Israel, with an extremely high rate of success, preventing numerous casualties and damages to civilians and military personnel, as well as critical strategic assets.

The development program of "Iron Dome" was kicked off in mid-2007 and included the development of an interceptor, launch system, Battle Management Control (BMC), radar adaptations, and integration of all system components. The initial test was conducted in 2008, and a full-system test on 2009. The combination of all of these elements resulted in the successful completion of the development phase and the delivery of the first operational battery from the production line within a record time of less than three years.

Currently under development in partnership with Raytheon USA, David's Sling is an affordable and lethal solution against long-range artillery rockets (LRAR), short-range ballistic missiles (SRBM), cruise missiles (CM) and traditional air defense threats. The system provides optimum protection

for the homeland as well as forward deployed forces. The system recently completed a first full interception test.

One of Rafael's most recent developments in the area of air defense is MIC4AD (Modular, Integrated C4I Air & Missile Defense). MIC4AD is an advanced, unified, integrated C4I system that commands and controls the operation of both air and missile defense, including air-superiority missions. MIC4AD provides a total solution for multi-system, multi-layer and multi-range air and missile defense, traditionally operated as separate commands.

A core requirement in an aerial campaign is the ability to detect, recognize, identify and perform target navigation. Rafael has developed "Litening", an advanced electro-optical Pod, in use by more than 20 air forces around the world, mounted on a variety of kinds of fighter aircraft. Rafael's has also developed Reccelite, for day/night reconnaissance real-time imagery collection and data transfer via data link communications for manned and unmanned aerial vehicles.

The integration of these capabilities and others makes Rafael a leading

authority in providing solutions in the area of critical asset defense, as part of Rafael's System Integrated Solutions (SIS). Such solutions will enable many countries to deal with challenges they face from sea, air and land, in protecting infrastructure such as bases, power plants, rigs, ships and more.

There is a growing need to increase cooperation and partnership with global clients, while maintaining knowledge transfer and adaptation of existing solutions to the specific needs of the user, thereby providing the added value in a highly competitive environment. As such, one of Rafael's main strategic endeavors is to bolster its cooperation with the DRDO, as well as with other leading defense industries in India.

At the Bangalore Air Show Rafael will present its' complete Air and Missile Defense Systems for the first time at the outer display (including Iron Dome and David's Sling). Among its advanced defense solutions, Rafael will also display the Spice 1000/200 Precision Guidance Kits; Electro-Optic and Communication Systems (Litening, Reccelite, Toplite, Imilite, Global Link) and the Spike Family - Multi-Purpose, Tactical guided Missile Systems.



P S Krishnan
Director and Distinguished Scientist
ADE

Rustom-2 first flight in early 2014: ADE

ADE together with NAL has developed three configurations of micro air vehicles of 300 gm class and has demonstrated their capabilities to a number of Services and Para Military Agencies. ADE has also developed 2 Kg class of UAVs and brought them to the level of the 300 gm version and has demonstrated their capabilities to the same users, says its Director and Distinguished Scientist Mr. P S Krishnan, in this interview to Aeromag Asia.

Could you give us an update on the Rustom-1 programme and its road-map going forward?

RUSTOM 1 is a project undertaken to get design solutions for automated nose wheel steering, external piloting, and making systems for heavier UAVs flying for long duration. Towards meeting these objectives we have had very good results and the requisite knowledge for RUSTOM-II has been gained. Fourteen flights done so far, have achieved this objective. Additional objective of exploring its capability as a UAV for the users is being evaluated. This was not the part of the original scope when the project was taken up. Thus a few tens of flights, as needed will be on-going activity dictated by the situation.

What about Rustom-2? What's the progress made so far?

After the sanction of the project in 2011 a lot of progress has been made and all the components of the aircraft and the airframe are coming in one by one and the integration will start soon. The first flight is being planned for early 2014.

Could you share your thoughts on the significance and applications of Rustom programme?

RUSTOM UAV program is very significant since it ushers us into the club of very few nations having such a high weight long endurance UAV capable of carrying out surveillance, reconnaissance, battle field damage assessment using sophisticated electro-optic, radar and other types of sensors to get the complete information of the area of interest. This is the way to

go for the networked battlefield of the future.

Could you talk about ADE's contribution in the field of UAV technologies in general?

ADE has been developing various types of unmanned vehicle systems right from mid 70's. We used to develop a target for surface to air missiles code named ULKA which was successfully used for the user trials. We then developed LAKSHYA, the high speed target aircraft which is the work force for the targets used by all the three Services for the past fourteen years and of course the DRDO is also using LAKSHYA for evaluating the performance of the missiles. We have also made the LAKSHYA-2 which has a very low altitude flying capability for evaluating sea skimming missiles.

We made our beginning in the low speed UAVs through KAPOTHIKA which was fielded in army exercises in the past. This led to the requirement of NISHANT UAV having 4, 5 hours endurance which is capable of being launched from rough unprepared terrains as against the other UAVs being used now by Army which have to be launched from taxi runways. The NISHANT at the end of its mission is recovered by means of parachutes at pre-designated point which can even be changed while in flight. Thus NISHANT is a very flexible system which has also a lot of fail-safe features.

Could you throw light on micro air vehicle programme in the country, of which ADE is a key part?

ADE together with NAL has developed

three configurations of micro air vehicles of 300gm class and has demonstrated their capabilities to a number of Services and Para Military Agencies. ADE has also developed 2 Kg class of UAVs and brought them to the level of the 300gm version and has demonstrated their capabilities to the same users. ADE is now spearheading a National Programme on Micro air vehicles in which more than 50 projects are being done by agencies like NAL, the renowned institutes, NDRF etc. The aim is to develop technologies for the future like vision navigation, obstacle avoidance, biometric sensing etc. to name a few.

Could you share your thoughts on Aero India 2013 and the capabilities that ADE is going to showcase at this mega Bangalore event?

The Aero India in general and the 2013 version in particular are events which the lab looks forward to show case its capabilities through all types of media and the physical contacts so that the business of development which requires the collaboration of starting with the customers, sister R&D organisations involved in such development from other departments be it from public or private, manufacturing organisations, component suppliers etc can come together and share our positions and needs so that every one can benefit at the end.

We are planning to put up the full scale UAVs NISHANT and RUSTOM 1 and if possible RUSTOM-II, telemetry station called FLYDAQ, as outdoor exhibits and the electronic units in the area of Telecommand, telemetry, flight control systems etc. as indoor exhibits.

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AWACS programme getting firmed up on the drawing board: CABS



Dr. S Christopher
CABS Director

The year 2013 will be the Year of Flight-proving the AEW&C System. After an intense phase of flight-testing and system-proving, an operation-worthy fleet of 'AEW&C India' will be delivered to the Indian Air Force by early 2014, says CABS Director, S Christopher, in this interview to Aeromag Asia.

What is the update on the AEW&C Programme?

For the AEW&C Programme, the 2012 was a Year of System Integration and Testing. The many sub-systems of the AEW&C have been integrated and tested on a stand-alone mode and as part of the total system at the System Test and Integration Rig (STIR) facility. The Anechoic Chamber and the Roof-Top Test Rig were extensively used for functionality checks and performance evaluation of the system.

The first of the EMB-145 I aircraft modified for the AEW&C role by M/s Embraer, Brazil, arrived at CABS in August 2012 followed quickly by the second aircraft in December 2012. Integration of the AEW&C Mission System on to these aircraft has begun and is steadily progressing.

The year 2013 will be the Year of Flight-proving the AEW&C System. After an intense phase of flight-testing and system-proving, an operation-worthy fleet of 'AEW&C India' will be delivered to the Indian Air Force by early 2014.

Which are the next milestones you are looking at vis-à-vis this programme?

Clearance of the AEW&C Mission System on the aircraft involves a few steps. The Mission System should operate safely without affecting the aircraft's avionics

systems. Towards this the AEW&C Mission System will be tested and cleared from Electro-Magnetic Interference/Compatibility (EMI/C) aspects, initially with the aircraft on ground and later during flight.

The AEW&C system will then be put through a rigorous scheme of development testing and fine-tuning of its performance vis-à-vis the Operational Requirements. In the process, the system hardware and software will get fully qualified and obtain the necessary Initial Operational Clearance. This process is expected to be completed in about a year.

Could you throw some light on the significance of AEW&C system and its applications?

Efforts to acquire 'early warning' in military warfare seem to date back to 200 BC when man-lifting kites were used for spying on enemy positions in China. World War II saw use of tethered balloons for reconnaissance. The Gulf War of 1991 was indeed won by a small fleet of AWACS aircraft. In strategic defence role, the AEW&C/AWACS systems can help detect, identify, track and intercept airborne threats.

AEW&C/AWACS has proven to be a true Force Multiplier. There are now more programmes in the world today to

develop AEW&C/AWACS systems than Fighter Aircraft. AEW&C/AWACS systems help pre-empt wars. May be, this ability of the System will one day bring about a World without War!

Could you talk about the spin-off impact of the AEW&C programme?

The technologies generated through the programme, like the Transmit-Receive Multi-Module and the Active Electronically Scanned Array for the Primary Radar, have given a boost to Indian self reliance. Apart from saving enormous foreign exchange for acquiring these technologies, the indigenous effort has resulted in a guarantee against 'technology denial' by nations that have acquired these already.

The infrastructure created like the Planar Near Field Measurement facility and the System Test and Integration Rig are major assets of generic nature and would serve the Nation also through future programmes with only minor scaling up for specific requirements.

Defence Acquisition Council (DAC) of the Govt of India has given clearance for procurement of a large quantum of Transponders/Interrogators/Combined-Interrogator-Transponderunits against the Tri-Services' requirement in the near future. CABS has developed IFF MK XII (S) products with identified production

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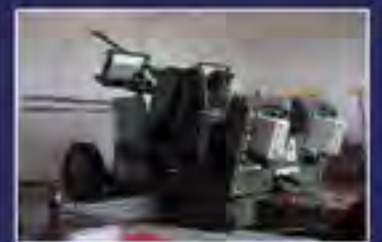
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agencies to meet a substantial segment of this requirement.

More importantly, the success of the AEW&C programme is the outcome of orchestrated efforts by the work-centres in DRDO, Indian Air Force, CEMILAC, DGAQA and the Brazilian aircraft manufacturers. Academic Institutions, R&D Laboratories, S&T Centres and Industries in the public and private sector also dovetailed with programme tasks and offered specialist support. This synergic networking that has given us a new 'strategy for success' is a major windfall from the programme.

What are the new initiatives of CABS and what are the new proposals at hand?

The confidence gained and the measure of success obtained through the AEW&C

programme has already prompted initiation of the follow on programme – An AWACS with enhanced operational radar range and endurance utilising the indigenous technologies and design capabilities generated through the AEW&C exercise. The phase-I of the future programme has been cleared by Govt. as SA to RM announced in the press meet on 25th Jan 2013 with an outlay of more than 5,000 crores to CABS, DRDO.

The new programme is getting firmed up on the drawing board.

What are your thoughts on Aero India 2013 and what are the capabilities you are showcasing in this mega Bangalore event?

The numerous Divisions of HAL, the many Centres of ISRO, the aerospace

laboratories of CSIR, the aero-cluster laboratories of DRDO, the renowned Aeronautical Institutes of Higher Learning, the large Civil Aviation network, and the Indian Air Force that is among the largest in the world, make India the natural 'Aeronautical Hub' of the South Asian region. One need not look for more reasons for the rapid growth in stature of AERO INDIA with every successive event. It is indeed filling a natural need of the nations in the region for interactions, collaborations, and developments in matters aerospace, besides buying and selling.

DRDO will be showcasing technologies and products born out its many R&D programmes. CABS, as part of the DRDO team, will be there with the AEW&C India aircraft and the AEW&C technology wares.

Defence Minister hands over HAL-DO-228 aircraft to Seychelles

The Defence Minister Mr. A. K. Antony handed over HAL's DO-228 to the Minister of Foreign Affairs of Seychelles, Mr. Jean-Paul Adam, at a function in New Delhi. The maritime surveillance aircraft will be used to guard the extensive coast line of island nation. "It is yet another milestone of our close friendship between our two countries", said Mr. Antony. He congratulated HAL for delivering the aircraft much ahead of schedule.

The Seychelles Foreign Minister appreciated the gesture and said the DO 228 will enable his country to fight piracy and strengthen the overall security in the Indian Ocean.

"The aircraft to be provided to Seychelles will be supported by HAL team for maintenance on site to enable the new user get the requisite expertise", said Dr. R. K. Tyagi, Chairman, HAL.

The aircraft is equipped with the latest state-of-the-art facilities and is excellent platform of maritime applications, he added.

Mr. Waven Williams, High Commissioner for Seychelles to India, Major Micheal Poupponneau, Commanding Officer,



Defence Minister Mr. A.K. Antony handing over keys of HAL Dornier 228 to Minister of Foreign Affairs of Seychelles Mr. Jean-Paul Adam in New Delhi.

Seychelles Air Force, Chief of Naval Staff, Admiral D.K. Joshi, Mr. R. K. Mathur, Secretary Defence Production, Mr. Sanjay Singh, Secretary (East), Ministry of External Affairs were among the invitees on the occasion.

Fuelled by the growth prospects of this aircraft, HAL has also set eyes on export market. While the full aircraft structures

are already being exported to Germany for assembly and supply to world-wide market, efforts are underway to achieve direct exports. The company is making efforts to exploit conducive military markets in Mauritius, Nepal, Vietnam, South Africa, Afghanistan and Columbia. Efforts are also to penetrate civil export markets that are suited for HAL-DO-228s.

Apollo sees huge biz opportunities in India and for India

Apollo Aerospace Components is a European aerospace supply chain management company headquartered in the UK. Their Indian company is now open for business and is growing rapidly by working with a good number of the major Indian Manufactures to improve supply of products, increase supply chain and operational efficiency and lowering total overall costs.

Apollo are committed to quality. They hold many industry approvals such as Airbus, AgustaWestland and Spirit Aerosystems as well as AS9100 Rev C. It is also the only European distribution business to have attained the prestigious UTC Supplier Gold accreditation. This programme, run by United Technologies, is based on proven excellence. It demands at least 99% on-time delivery and 100% quality performance over a 24 month period. The company supplies parts to customers in over 20 countries.

Apollo India brings a world of high quality ready-made aerospace components to the doorstep of India's aerospace industry, providing access to a worldwide network of more than 250 specialist suppliers. Using procurement expertise built up over more than 30 years, its staff work with colleagues in Europe and North America to source a comprehensive range of high specification fasteners and components and complimentary products for companies throughout the sub-continent.

Through its new office facility in Bangalore, experienced Apollo staff also work closely with many of India's top machining and fabrication specialists, building a unique network to manufacture and supply high quality components to leading aerospace customers throughout the world.

The combination of first class local manufacturing facilities with Apollo's knowledge, expertise and quality approved management systems, logistics and supply chain skills, enables the company to supply finished parts to specification, at lower costs and to the required quality standard.

Apollo is keen to expand business in India. It is looking to acquire land to in an SEZ in Bangalore to build its own facility but is also currently evaluating other possible bases in order to best support it's developing customer base.

The company enjoys good relations with the Indian Aerospace Industry. The company has a long association with HAL. Apollo has good business ties with L & T, QuEST and Maini group, CIM Tools and TATA Advanced Systems. It is currently implementing a number of in house added value projects.

According to Apollo Aerospace Components Chief Executive Mr Jason Crabtree, India is a growing market with tremendous business opportunities. It represents their main business development drive. He sees the company



Mr Jason Crabtree
Chief Executive
Apollo Aerospace Components

here as an India business doing business for and on behalf of the developing industry.

With a pool of talented and qualified engineers and low cost of manufacturing, the company will scale up investment in future to enhance business volumes in India. Apollo is planning to recruit more engineers for its Indian operations soon.

Apollo has a strong presence in Europe and as a major supplier of aerospace components to the Airbus supply chain and other major OEMs. Mr Crabtree added that the quality of Indian Aerospace industry is fantastic and that Apollo is keen to promote and leverage the Indian capabilities.

The local manufactures are also maintaining good standards with cost effective products. Apollo sees India as a future growth centre. With a good understanding about the requirements of the customers, Apollo is very confident about its prospects in India. They proud to have developed so many strong and valued relationships over the last few years.

Bombardier to showcase two class-leading jets at Aero India

Bombardier Aerospace announced that it will showcase two of its class-defining jets at this year's Aero India airshow. On display will be the Challenger 605 and Global 6000 business jets.

"India represents huge potential for business aviation," said Nilesh Pattanayak, Regional Vice President, Sales, Asia-Pacific. "As the economy grows and the

need for global and regional corporate travel increases in the region, the value of a business jet is now well established. Our Global aircraft family is the market leader in India and we look forward to having the opportunity to showcase a Global 6000 jet, our class-leading Challenger 605 jet and presenting our overall product portfolio.

"It's an exciting time for business

aviation in India, and we are playing our part in connecting India's business leaders with the rest of the world by providing the ultimate tools to improve their efficiency," added Mr. Pattanayak. "2012 was a great year for Bombardier Business Aircraft as we captured 60 per cent of business aircraft orders worldwide and we are continuing to build upon that success in 2013".



Subramanyam D R
Director, SLN Technologies

SLN Technologies record steady growth

Integration services, embedded products & software to defence, aerospace, public sector & DRDO organizations in India

Its well acclaimed new products are:

Industrial Automation and Measurement products – ADDI DATA GMBH, Germany
World class Technology from ADDI DATA, Germany for the Industrial Automation and Measurement products. ADDI DATA provides solutions worldwide in numerous industrial areas: automotive and metal industry, engine building industry, tailor-made machinery, aircraft and chemicals industry etc, they are used for quality control, process control, signal switching, data acquisition, motion control or position acquisition.

Products :

- Interference – free PC Boards (PCI Express, PCI, CompactPCI, PC/104-PLUS bus) Intelligent Ethernet Systems
- Real-time open source PAC System MSX Box

Component Groups for packaging of electronic products – INTERMAS GMBH , Germany

Intermas-Elcom develops, manufactures and markets components and modules for the “packaging” of electronics: cabinets, housings, subracks, cassettes and an extensive range of accessories which leaves nothing to be desired. Interma products are used in almost all fields of industrial electronics, telecommunications, military and traffic technology.

Products :

- Cabinets
- Housings
- Subracks
- Industrial PCs
- Cassettes
- Power Supplies

Speciality Silicone Compounds, Components and Coated Fabrics- ARLON Silicone Technologies, USA

Arlon Silicone Technologies has been a leader in silicone rubber and silicone adhesive technologies since 1954... Arlon offers the highest performance reinforced silicone solutions in a broad range of products from thermal insulation pads and molded heat shields for aircraft, aerospace, and automotive applications to substrates for flame retardant flexible heaters, ducting, and motor coil insulation.

Arlon develops and manufactures specialty silicone compounds, components, and coated fabrics for a variety of applications and industries.

Products :

- Reusable Silicone Press Pads
- Self Fusing Silicone Tapes
- Coil Insulation
- Electronic Adhesives

Laser Technology Applications – EO Technics Co., Ltd , Korea

EO Technics is the worldwide leader of the laser- based application industries. With more than 20 years of dedication in developing laser technology and applications, they bring a wide range of products in laser marking, drilling, trimming and cutting . EO Technics has achieved an eminent position as a laser-based equipment supplier in the field of semiconductor, PCB, FPD, telecommunication and general industries.

Products :

- Laser Marking
- Laser Cutting
- Laser Drilling
- Laser Dicing
- Laser Patterning
- Laser Trimming
- Laser deflasher
- Laser Titler

Bangalore-based SLN Technologies is an ISO 9001 - 2008 certified company since 2002, with branches all over India. It is one of the leading suppliers of equipment in Printed Circuit Boards and Electronic Manufacturing Service (EMS) industry since 1995. Since its inception, the company has been growing continuously to become one of the leading suppliers, state-of-the-art manufacturing equipment and raw materials to electronics industry in India. This has been possible through 23 years of hands on experience in the Industry and today the company offers the complete turnkey project solutions for PCB and EMS Industry.

SLN is also one of the reputed & approved vendors for supplying customized electronic system development &



IAI: Setting Aim for Future Growth



Mr Joseph Weis
IAI President & CEO

as reflected in the Barak 8 programme currently under way.

In the UAS domain, IAI's Heron family of Medium Altitude Long Endurance (MALE) drones is already positioned as a world leading UAS in terms of number of operators and operational hours. Deployed across five continents, Herons are proving themselves on a daily basis as reliable, flexible, combat-proven unmanned platform suitable for a wide range of missions. Of a particular value for India is the maritime surveillance capability of the Heron UAS; its wide range of sensors have proved highly effective in supporting naval operations, maritime surveillance as well as homeland security missions. IAI is investing much effort to further develop the Heron system, its ground segment, payloads and performance. Offering higher operating altitude, longer endurance and heavier payload capacity than most drones currently available on the world market, Heron TP is positioned to become a platform of choice for European and other leading air forces. In the segment of special mission aircraft IAI's systems are already operational with a number of customers worldwide with maritime surveillance, intelligence gathering (SIGINT), and Aerial Early Warning (AEW).

IAI expects its commercial aviation business line to continue and thrive, reflecting an expected recovery in the global economic market. The company has recently completed Federal Aviation Administration (FAA) certification of the new G280 medium-size business jet built

for Gulfstream.

Space is another growth area for IAI. The company currently has a few active satellite programmes underway, for communications and surveillance satellites. Amos-4 satellite, built by IAI for Spacecom, is scheduled for launch in June 2013 from Baikonur, Kazakhstan. Once positioned at 65°E it will cover Russia, India and the Middle East with multiple Ku and Ka transponders creating a powerful platform, enabling a wide range of cross-band, cross-beam connectivity options.

IAI has also commenced the construction of Amos 6 - the next generation communications satellite, offering new capabilities unavailable before. Other satellite projects currently on the horizon include various reconnaissance satellites based on the latest Opsat 3000 platform.

IAI completed on January 2013 a successful public offering of bonds totaling about \$317 million (USD), issuing a new series of Shekel-based and unlinked bonds with a fixed interest rate. The extent of demand during the auction reached about \$846.5 million (USD). The final rate of interest was 4.1 percent, reflecting a gap of 0.8 percent above the yield of government bonds of the same average maturity.

The amount issued is impressive, since it is the largest offering conducted during 2012 in the Israeli capital markets. This is the third time the company has issued bonds and this is the largest of the three. The bond series received an “AA/ stable” rating from the Ma'alot - S&P rating agency, with an average maturity of 5.7 years.

With annual sales of over \$3.4 billion, and orders backlog exceeding \$9 billion, Israel Aerospace Industries (IAI) is ranked among Israel's top five industries. As Israel's largest aerospace and defence exporter, and an important supplier for India's military services, IAI is involved in major programmes that implement the most advanced technologies. In the missiles domain, IAI sees the air and missile defence as an important growth opportunity. IAI's leading edge in this area is the comprehensive network-centric integration of weapon systems,

Project to optimize aerodynamic design

Since the Wright brothers, advances in aerodynamics have typically come from two places: field testing and the wind tunnel. More recently, a new tool has been added to the toolbox. Computers using Computational Fluid Dynamics (CFD) have become a critical new tool in development and testing of design alternatives. The Department of Mechanical and Process Engineering at The Technical University of Kaiserslautern (www.uni-kl.de) is renowned for its advancement of the study of aerodynamics, improving the efficiency and stability of aircraft and aerospace vehicles in flight. Presently, the University has undertaken a project involving testing of Aerospace structures using all three; test flights, wind tunnel and CFD.

Fuselage model in a wind-tunnel

This project uses the complimentary discoveries made in the physical flight and wind tunnel, as well as those made in a CFD simulation on the computer. Of course the value of the discoveries in each mode is dependent on the fidelity of the physical model to the computer based model. Any differences in the form of the models could taint the results. To get the highest quality models, the SAM Department (Strömungsmechanik Akustik und Strömungsmaschinen) relies heavily on Rapidform XOR.

Scanning process of Fuselage model using FARO Scan Arm

No matter what kind of power system is being used for creating thrust, aeronautical engineers must design to optimize the aerodynamic properties of the aircraft. When improving on an existing design, the engineer generally needs to analyze the current aircraft in a CFD simulation by using a watertight polygon model. This model is often made from laser-scans of the physical model (i.e., an existing fuselage, a wind-



tunnel model).

Rapidform XOR generates the best-in-class mesh data from scan data, as well as from the CAD model. For physical model conversion: XOR uses its "Mesh Buildup Wizard™" to create a defect-free, watertight mesh automatically by combining multiple scans from many points of view, merging and remeshing the result to yield an optimal mesh for CFD. For CAD models, XOR uses the mesh generator to create a high-quality mesh model from the CAD model.

To confirm the created model's dimensions, XOR's "Accuracy Analyzer™" provides feedback on the dimensional deviation of the input vs. the output polygon models via a variety of analysis tools (mesh to mesh, mesh to CAD etc).

Defect-free mesh model generated from XOR using Mesh Buildup Wizard™

Any changes made as a result of CFD runs (to optimize its flow, reduce flutter, etc.) must be reflected back into the CAD model. XOR offers two ways to convey the changes made to the polygon model back to CAD. The CAD model can receive NURBS surfaces representing the changed polygon model, i.e., 2G (second generation) modeling. Alternatively, the modeler could use a unique feature of XOR is a function called CAD correct which will reform existing CAD

surface to reflect the shape of polygon automatically. However, one limitation of 2G modeling is that these forms are not easily edited or modified in the CAD environment.

If an editable CAD model is the desired result, XOR also offers 3G (third generation) modelling; that is the means to create an editable, parametric CAD model from the polygon model. The result is a native CAD model in NX, Pro Engineer and Solidworks, including an intact editable history-tree. 3G modelling facilitates feature based parametric editing within the CAD environment, very useful if further changes will result from downstream processes.

The Technical University of Kaiserslautern project is well under way, testing multiple iterations in the CFD environment which uses XOR's best-in-class polygon model. The results so far have met or exceeded the team's expectations, and they are identifying new projects for Rapidform XOR's modelling capabilities in the future.

Akuva Infotech Pvt. Ltd. is the official reseller of Rapidform Software in India. Contact us for Demonstrations and Training & and insight into how 3D Scanning and Reverse Engineering can improve efficiency at your workplace.



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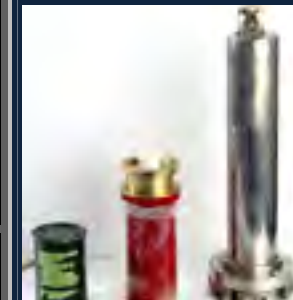
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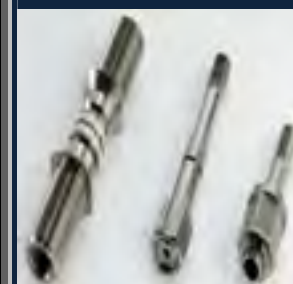
Gas Generator Actuator



Pyrocartridge



Tear Gas Grenade



National Instruments excited about growth prospects in India

NI IndRA (India, Russia and Arabia) represents one of fastest growing regions for National Instruments, which excited about the significant outcome of NI's strategic and long-term R&D investment in India. As India's influence on the global marketplace grows, the NI India team collaborates with hundreds of customers in universities, SMEs and multinational corporations to nurture local innovation and accelerate productivity, says Mr Jayaram Pillai, Managing Director for India, Russia & Arabia, National Instruments, in this interview to Aeromag Asia.



Jayaram Pillai
MD for India
Russia & Arabia
National Instruments

Could you talk about National Instruments products, services and solutions?

Since the founding of the company in 1976, National Instruments has sought to enable and empower engineers and scientists with tools that help them get their job done faster and help them realise their impact on our society. Our mission is to equip engineers and scientists with tools that accelerate productivity, innovation, and discovery in connecting to the physical world around us.

Fundamentally we provide software and hardware platform tools to measure and control the world around us. We call this concept Graphical System Design, an evolution of our vision of software-defined instruments (or virtual instrumentation). Graphical system design is a platform-based approach to accelerate the development of any system that needs measurement and control, in test, monitoring, embedded, control, or any combination of these applications. On the hardware side, we provide modular measurement and control hardware with thousands of configurations available to mix and match for custom analog, digital, machine vision, control, and other needs, from lab to industrial form factors. All of the hardware can be programmed using LabVIEW, which enables the user to design, prototype, and deploy custom systems that acquire, control, analyse and present the real-world data.

Could you talk about the acquisition of Signalion?

Founded in 2003 as a spinoff from the

Technical University Dresden, Signalion provides test and measurement (T&M) products and services for wireless mobile communications. Having started the business with supplying highly specialized consulting services in the area of mobile communications Signalion introduced the first test-UE (UE: user equipment) for the upcoming standard LTE ahead of all competition in 2007. Since then Signalion has been working very closely with the customers to meet their particular requirements. Customer intimacy, product customisation and being first in the market with new solutions have been the drivers for Signalion's success and have made Signalion a particularly recognised brand in the domain of wireless communications systems testing. Headquartered in Dresden, Germany, the company has approximately 50 employees. The core expertise of the company is products and solutions for wireless communications base station test and LTE UE (user equipment) simulation. Signalion brings strong talent and technologies to the NI platforms that are critical as NI continues to drive growth in the RF T&M industry. Signalion joining National Instruments adds key technical talent with depth in complex RF and communications algorithms. Signalion expertise and IP can evolve NI graphical system design software (LabVIEW) and modular hardware (PXI) to create products for UE (user equipment) emulation, base station test, and signaling for mobile device production test.

Could you talk about the latest innovations in 'Graphical System

Design' and how it is fueling growth and innovation for scientists, engineers and educators?

National Instruments continues to invest heavily in R&D so that we can deliver products that make our customers successful. While the list of latest innovations is pretty big, let me talk about some of our latest releases. This year, we are proud to release the world's first Vector Signal Transceiver. Combining a RF vector signal analyser, a RF vector signal generator and high-speed digital I/O in one 3-slot PXI module, this vector signal transceiver is a fraction of the size and cost of traditional mixed signal RF solutions while offering orders of magnitude faster speed and maintaining industry-leading measurement performance. Even more important, the NI PXIe-5644R is the world's first software-designed instrument. With an open, user-programmable FPGA at its core, users can modify its LabVIEW-based software and firmware to create an instrument specific to their exact needs. So essentially, after years of learning to program vendor-defined instruments and decades of manual work, engineers can now use the NI PXIe-5644R vector signal transceiver and LabVIEW to define their instrumentation. VST is enabling customers be successful in application such as software defined radios to prototype future communication standards and embedded protocols inside

instruments to build protocol-aware testers. With a software-designed approach, engineers no longer have to ask, "How do I make this box do what the vendor intended?" Instead, they can start asking, "What do I need this instrument to do?" and easily make it happen.

Could you talk about the latest version of LabVIEW -- how it has evolved from a product to a powerful ecosystem?

The heart of the graphical system design approach is the LabVIEW software. First introduced in 1986, LabVIEW revolutionised the way that engineers and scientists develop systems in an intuitive graphical way. LabVIEW takes advantage of the fact that engineers are taught to think in terms of block diagrams when planning their systems – in LabVIEW engineers and scientists can create a block diagram of what they want their systems to do and deploy those programs seamlessly on to NI hardware. The same LabVIEW software that allows kids to program the LEGO Mindstorms robot, also allows scientists do real-time control at CERN's Large Hadron Collider. So essentially, you have a single tool that can help advance the problem solving capabilities of engineers from school through industry and advanced research. We have continued our innovation in LabVIEW 2012 by adding tools that improve the scalability of measurement

and control systems. LabVIEW 2012 provides recommended application architectures and training options designed to save time, ensure scalability, and lower maintenance costs. It also includes stability improvements and environment enhancements, derived directly from customer feedback, designed to increase productivity. LabVIEW 2012 also supports a large portfolio of new hardware products showcasing NI's commitment to expanding platform capabilities and enabling cutting-edge systems. One of the brand new additions to the LabVIEW 2012 family is the LabVIEW FPGA IP Builder that uses High-Level Synthesis technology to increase development productivity when programming FPGAs. With LabVIEW FPGA IP Builder, you can use algorithms written in a LabVIEW and combine them with requirement directives to generate an efficient and high-performance FPGA implementation of the algorithm.

A platform is more than just features and technology; it's also the infrastructure and the community. Everything about the platform's ecosystem is important for the long-term viability and support of a product – the services, support structure, networks and more. For LabVIEW to be a platform you also have to have a network of users and partners building complimentary products.

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Premier Explosives

The high Energy people



Dr. A.N.Gupta receiving the DRDO's 'Defence Technology Absorption Award' from Honourable Prime Minister Dr. Manmohan Singh.

Premier Explosives Limited (PEL) is a 32 years old company and a pioneer in the field of commercial explosives. However, in 2003 PEL took baby steps in the Defence propellant sector and today it is an acknowledged leader in India and the only company in the private sector meeting the solid propellants requirements of Defence and Indian Space Research Organisation.

The company, promoted by Dr A N Gupta, a technocrat, as an SSI unit, had a turnover of Rs 118 crore in 2011-2012 and the export earning is in the range of Rs 10 crore per year.

Prestigious award

Defence Technology Absorption Award 2007 by Defence Research Development Organisation, Ministry of Defence, was presented by Prime Minister Dr. Manmohan Singh on 12th May, 2008. This Prestigious award was awarded to PEL as recognition of its contribution in the field of Defence.

Defence

Solid Propellant:

Solid propellant is a fuel for a rocket. PEL is today working with DRDO and DPSUs in meeting the Indian Defence requirements of the solid propellant grains for both the Booster and Sustainer stage. Towards this end, PEL has set up world class facilities for the same. Recently PEL has installed 1000 te capacity press for the sustainer grain, which is a first amongst the private sector in India.

PEL has now the capability of producing the 'Free standing grains', 'Case Bonded

grains' and 'Fuel rich grain'. PEL has also been involved in the Design and Development of the propellant grain by DRDO at various stages of Development and it has to its credit designing of a 'smoke free propellant grain'

PEL is the only private company to have entered this high technology area and is now at the forefront meeting the critical requirements of the Indian Defence sector.

Today PEL is producing motors measuring up to 1 metre diameter and 3800 kgs, which have been successfully tested a number of times over the last few years.

Pyro Ignitors:

Premier develops and manufactures Pyrogen Ignitors for various size motors deployed in India.

Pyro Cartridges:

A pyro cartridge is an electrical initiator. It is used to initiate the explosive train for specific applications. Pyro cartridge functions on receiving the electrical energy, produces flame with hot gases and solid particles to ignite the contents of the igniter for propellant combustion. Today PEL is meeting most of the requirements of Defence and ISRO.

Other Defence Products:

PEL is producing Explosive bolts, Gas Generators, Pyro Actuators, Flash and smoke generators, special purpose squibs, Explosive transfer line for canopy severance system and Flares/Chaffs cartridges for the Indian Defence sector and has sufficient technological and

R&D strength to develop new products.

PEL products are evaluated by various quality assurance agencies like MSQAA, SSQAG, R & QA, OCRI, CNAI and SQA.

Space:

PEL is operating a 10 year O&M contract at SHAR for manufacture of solid propellant. PEL is supplying special products to ISRO at Thiruvananthapuram and Sriharikota.

Pilot plant

PEL is having a pilot plant for scaling up high energy materials, manufacturing from lab scale to pilot plant scale. So far PEL is successful in scaling up the production of CL 20 and NHN to 5 Kg level in this plant. HTDB-DNCB up to 250 gm level is also developed by PEL.

Premier ultra safe green detonators – lead free

Specially developed by Premier's In-house R&D division, PEL is the only company in the world that is manufacturing Detonators on commercial basis with NHN as the Primer (instead of LA/LS) to make a product which is safe to manufacture, use and eco-friendly.

OR/CR bases tear gas grenades

Oleo resin based tear gas grenades and CR grenades are used for mob control. The ignition is brought out by the phenomena of percussion. Premier is the leading Indian player for meeting the requirements of Defence, Central and State Police forces.

SIATI – UNIDO Cooperation Project



UNIDO-SIATI team with Mr.M.Vidyashankar, Principal Secretary, Govt of Karnataka.

SIATI has partnered with United Nations Industrial Development Organization (UNIDO) for their India Program " UNIDO Aerospace Project SME supply Chain development" As the first program, a seminar on "Sourcing & Supply Chain Management for Indian Industries" was organized at Bangalore. 108 delegates participated in the seminar. An MOU between UNIDO and SIATI

was signed between Mr. Alejandro Vera casso, Senior Advisor, Investment and Technology Promotion, UNIDO and Dr.C.G.Krishnadas Nair, President SIATI.

Mr.M.Vidyashankar IAS, Principal Secretary, Dept of Commerce and Industry, Government of Karnataka was the Chief Guest. Mr. Ian Felton, Dy High Commissioner of UK was the Guest of Honour.



Signing of SIATI – UNIDO Agreement
L to R - Mr. Alejandro Vera Casso, Air Cmde(Retd) Varkey, Dr. C.G.Krishnadas Nair



Mr Ian Felton
Dy High
Commissioner



Mr Vidyashankar IAS
Principal Secretary,
Govt of Karnataka.



Mr Martin Wright
CEO, NWAA



Dr. BalaBharadwaj
CEO,
Boeing Research & Tech



Mr.Scott Bairstow
Programme Manager
NWAA



Mr. Aaron LE PIERRES
UNIDO Aerospace
Expert



Air Shows 2013

- Australian Air Show (Avalon 2013) – Feb 26 to 3rd Mar 2013
- LIMA 2013, Lingkawi, Malaysia – 26 to 30th Mar 2013.
- Paris Air Show. Le Bourget – 17 to 23rd Jun 2013.
- Dubai Air Show 2013 – 17 to 21st Nov 2013.

Those who are interested to take part in the above events Please contact at:

office@siati.org or siatiban@gmail.com

Formation of IIAEM

SIATI along with major Aerospace Industries formed International Institute of Aerospace Engineering and Management (IIAEM) under Jain University. IIAEM offer short programs of 3 to 5 days, diploma, graduate and post graduate degree in Aerospace Engineering, Airport Construction and Management, Aviation Business management.



IIAEM was formally inaugurated by Dr. K. Kasturirangan, Member, Planning Commission, Science & Technology, GOI and Former Chairman, ISRO

Society of Indian Aerospace Technologies & Industries (SIATI)

SIATI was founded in 1991, to encourage, facilitate and promote the growth of Aerospace Industries, technologies and education in India, established with the patronage of major aerospace organizations such as such as Hindustan Aeronautics Ltd. (HAL), Indian Space Research Organization (ISRO), DRDO Labs, Aeronautical Development Agency (ADA), National Aerospace Laboratories (NAL), Civil & Military Airworthiness Quality & Certification Agencies. Currently SIATI has membership of around 300 industries from both public and private sector. SIATI is a professionally managed non-profit, non-commercial organization.

Objectives :

- Create awareness among the members on business opportunities, industry requirements and technology trends.
- Showcase the collective strength in

terms of capabilities, products and services of Indian aerospace companies in the domestic and international forums.

- Effectively represent the Indian aerospace industry in all appropriate forums for its healthy growth.
- R&D, Academia – industry interaction, Training and Skill development Encouraging & promoting indigenous development through SIATI Awards.

Activities:

Promote indigenization for achieving 'Self Reliance'

- Conduct Seminars and Workshops for the development of indigenous aerospace materials, equipment, structures, etc and to have direct industry interaction.
- Promote International Co-operation between Indian and Overseas aerospace Industries and

Organizations.

- Participate in Air Shows and other international events along with member industries. and showcasing the collective strength in terms of capabilities, products and services of Indian Aerospace companies in the domestic and international forums
- Instituted "SIATI Awards for Excellence" in indigenous development of aerospace technology and manufacture of aerospace material, components and systems etc. and awarded to the selected companies, and "SIATI Life Time Service Awards" to selected individuals for their contribution in the aerospace discipline.
- Skill Development – SIATI along with BCIC formed an Aerospace Sectoral Skill Council (SSC) under the National Skill Development Corporation.

SIATI Council of Trustees

SIATI council of trustees consists of eminent persons drawn from various Aerospace organizations viz. HAL, ISRO, ADE, NAL DGCA etc and Private Industries. Present council of trustees are:



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Nair
Hony. President



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Mr. Francis Xavier
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Director (D&D)
Hindustan
Aeronautics Ltd.,



Arunakar Mishra
Chief Executive
Genser Aerospace
& IT Pvt. Ltd



Prof. E.S. Dwarakadasa
Chief Executive
Officer
KHMDL,



P. Jayapal
Scientist 'G'
CEMILAC



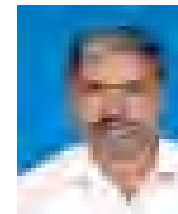
Air Cmde. (Retd.)
R. Malhotra
COO & Head
Dynamatic
Technologies Ltd



Nagabhusan
Junappa
Vice President
QuEST, Global.



Dr. Radhakrishnan
Director – R&D
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DRDO Bhavan,
New Delhi



G.T. Selvan
Dy, Director General
of Civil Aviation
Ministry of Civil
Aviation, Gol,

Regional Representatives



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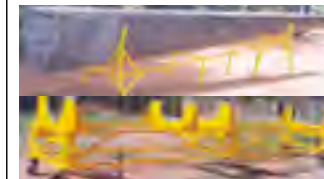
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Engineering Division

Ground support & material handling equipments as the industry knows it; is a prime factor in the industrial and engineering segment.

Advanced machines and latest technology manufacturing with innovation in products is the key to our success.

Customized products to meet any Customer Requirement



Electro Chemical Division

Anodizing of Aluminium Alloy for Spacecraft Onboard Components. ISRO Qualified Anodizer in India.

Some of the defined processes undertaken by us for SPACECRAFT ONBOARD COMPONENTS are:

ANODIZING ON ALUMINIUM ALLOY

1. Normal Anodizing on Aluminium Alloy
2. Selective Anodizing on Aluminium Alloy
3. Anodizing & Inorganic Colouring
4. Selective Black Anodizing on Aluminium Alloy
5. Selective Hard Anodizing on Aluminium Alloy
6. Chromating on Aluminium Alloy
7. Multi-coating on Aluminium Alloy (Anodizing, Black Anodizing & Gold Plating)
8. Electroless Nickel Plating on Ferrous & Non-Ferrous

GOLD PLATING

1. Gold Plating on Kovar
2. Gold Plating on Invar
3. Gold Plating on Stainless Steel
4. Gold Plating on Aluminium Alloy (Selective)



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Awards & Achievements

CII-EXIM Bank award (EFQM Model) for Business Excellence for the year 2012.

THREE National Awards in 2009, and ONE National Award in 2008 from

Government of India, Ministry of MSME for Research & Development and outstanding entrepreneur efforts in manufacturing and services sector.

Proposed Plant- 3 (Aerospace Division) at Devanahalli Aerospace Tech Park

Pushpak Products India Pvt. Ltd.

NO: 303, 'PUSHPAK', MES RING ROAD, JALAHALLI,
BANGALORE-560013. Ph: 080-2838 2031/4644 Fax: 080-28389090
EMAIL: wings@pushpak.com WEBSITE: www.pushpak.com

PLANT 1: NELAMANGALA
PLANT 2: BIDADI

AN ISO 9001: 2008 COMPANY



Mr. Maheswar Rao, IAS, Commissioner of Industries, Government of Karnataka releasing a Table Top Book giving a detailed overview of the progress of Aerospace in Karnataka .Dr. C.G.Krishnadas Nair, President SIATI, Mr. Chandramouli, Vice President, Bangalore Chamber of Industries and Commerce (BCIC), Air Cmde (Retd) J Varkey, Hony Secretary General, SIATI also seen.

Global Aerospace meet focuses on Karnataka initiatives

SIATI, under the patronage from Dept of Industry & Commerce and with the support from Karnataka Udyog Mitra, Laghu Udyog Bharti, IMS Foundation, Hindustan Aeronautics Limited, Bangalore Chamber of Industry & Commerce, Indo American Chamber of Commerce organized a Global Aerospace Industry Meet on 10th & 11th December 2012 at Hotel Chancery Pavilion, Bangalore. The meet was organized to have a get together of Indian and overseas aerospace industries and entrepreneurs and R&D personnel and provide

forum for interaction for mutual collaboration with the support of Government of Karnataka leveraging the Defence Offset Policy.

The meet was inaugurated by Mr. Maheswar Rao Commissioner of Industries. A Table Top Book on "Karnataka-Home for Aerospace Education, Technology and Industry in India" was released on the occasion. The Technical sessions that followed had 17 presentations on the first day and 5 presentations on the second day on various subjects by Indian and overseas industry leaders.

SIATI Events - 2013

Following Seminars / Workshops are planned for the year 2013.

- Supply Chain Management - jointly with UNIDO under SIATI-UNIDO India Program for development of supply chain for Indian and Global Market.
- Workshop on Offset Opportunities. - Details of Offset policy 2011 and 2012: Arguments in favour of making the policy with retrospective effect from 2006, finding 'offset' partners.
- Aerospace Welding - Welding technology and equipment and applications, Friction stir welding and solid state welding, brazing, soldering & diffusion bonding. Modern trends in welding, Micro welding & laser welding. NDT and quality assurance.
- Advancement of Aerospace Materials and Technologies - High strength alloys, Magnesium alloys, special steel, titanium alloys, composites, shape memory alloys, intelligent materials and structures, Special finishing & coating process including high temperature coatings.,

nano materials and technology.

- Precision Castings / forgings - Technology, materials and equipment for manufacture of precision castings, precision forging technologies. Advance technologies and business opportunities.
- Advanced Machining process and machining Technologies.- machining of high strength aluminum and magnesium alloys, steel and titanium alloys, machining of composites, machine tools, high productivity machines (3 axis-5axis machines) cnc machining, cutting tools & technologies, super finishing.
- License Production and Joint Venture for Defence Equipments- Benefits to indigenous design and development from license production, Value addition to knowledge and skill, Technology absorption and upgrades, contract management challenges and solutions.
- Helicopter Technology & Business development- Advancement in helicopter design, multi role helicopters, improvements in speed and survivability. Business opportunities.

SIATI MEMBERSHIP INDIAN ORGANISATIONS

SIATI membership is open to Industry/Institution engaged in any or all fields of aerospace, such as Research, Design & Development, Manufacturing, Maintenance, Airline, Airport and Infrastructure Business & Management, Education and Training etc. Membership is restricted to industries / institutions and is not available in SIATI for individuals

MEMBERSHIP - OVERSEAS ORGANISATION

Industries / Institutions engaged in the aerospace field in countries other than India are invited to join as International members. SIATI will be an important link between overseas and Indian Entrepreneurs / Industry / Institutions and various regulatory agencies and policy makers to establish collaborations and development of technology and business.

There is considerable potential for collaboration in Research, Design, Technology development, Joint Venture, Co-production and partnership in Offset/Counter Trade Programs.

For details

Hony. Secretary General,
Society of Indian
Aerospace Technologies
& Industries (SIATI)
AeSI building,
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Off. Old Madras Road,
Bangalore - 560 075.
Tele #
080-25219951/25275262
Fax # 080-25292440
Email : office@siati.org,
siatiban@gmail.com

GTRE plans to develop engine for AMCA in collaboration with global engine house



Dr. C P Ramanarayanan
Director, GTRE

Gas Turbine Research Establishment (GTRE) is presently finalising the specification and technology requirement of a >100kN thrust class engine to be developed for the future twin engine powered Indian Advanced Medium Combat Aircraft (AMCA). This engine development programme and subsequent production will be pursued in collaboration with a reputed international engine house, says GTRE Director Dr. C P Ramanarayanan in this interview to Aeromag Asia.

Could you give us an update in GTRE's main charter to design and develop gas turbine engine for military applications?

The country's aero engine programme, first conceived in the 1990s, was considered ambitious in view of the risks, especially in materials and testing. The Government go ahead, notwithstanding the risks, has borne immense fruits. It has helped to identify the gap areas, technology readiness levels and generation of techno-commercial relationships. It has enabled GTRE and its associated work centres, Indian industries, academics to gain adequate understanding of the scope and complexity and the ways and means to address the same.

The recent progress and demonstration of a series of flight tests of Kaveri engine on the IL 76 flying test bed is a culmination of efforts carried out over these years. In fact, the flight testing of the first ever indigenously designed fighter aircraft engine is a great achievement for the aerospace community of this country.

Could you throw light on the advanced research work in the area of gas turbine sub systems?

The focus areas will be development of high temperature materials and coatings, advanced manufacturing, system integration, heat transfer management, life management and test infrastructure. A few technologies that are being pursued vigorously are Blisk technology, Multi-axis Thrust Vectoring Nozzle, Automatic

Engine Control System and Metal-Metal Composites (MMC).

Could you talk about GTRE's manufacturing and test facilities?

Manufacturing facilities for GTRE were conceptualised and set up at a time when there were no agencies capable of meeting our designers' requirements. As a result, today, the manufacturing facilities at GTRE are one of the best and are adequate to meet most requirements in engine development. Over a period of time, we have laid emphasis on creation of specialised expertise in the related multitude of areas which has not only benefited the aero engine programme, it has also provided a fillip to the local industry.

We have also leveraged on the fast developing Indian Industry and the opportunities that the global economy provides. Networking with production agencies within the country and abroad through a vendor management programme has not only enabled us to assemble and test our prototypes, we have done so economically. In-house design of process sheets for certification has ensured that quality standards are the highest. We are now looking at facilities for manufacture of high temperature components and large size aerospace quality GT materials.

Could you share your thoughts on spin-offs, particularly marine gas turbines?

GTRE has demonstrated the performance

of a Marine GT to the Navy as a Technology demonstrator. The gap on endurance requirements observed during these tests is a challenge which is being addressed. GTRE's designers have analysed the test data and identified the design changes required to fix the issue. A higher class of marine engine with improved performance and endurance - as per the requirements of the Navy - is on the drawing board. This engine is also likely to be suitable for land based power plants providing high quality of power suitable for high end applications like robotics, bio-medical etc.

Also, the Kaveri dry engine is planned to be used as a power plant for an experimental autonomous air vehicle for disaster management.

What are the other initiatives of GTRE and the proposals at hand?

The DRDO initiatives through the Aeronautical Research and Development Board, Contract Acquisition Research Process and Gas Turbine Enabling Technology initiative with Academic Institutions have facilitated academics to participate actively in R & D. Formal interactions with sister DRDO and CSIR laboratories have facilitated critical studies in core technological areas in addition to a spread in science and technology. GTRE is thus a critical knowledge repository on gas turbine engines within the country.

An appreciation of manufacturing facilities required for production has



SLN Technologies Pvt.

Electronics Systems Design and Manufacturing

Founded in 1995, SLN is specialized in Electronics Systems Design, Development, Testing & Certification and Manufacturing for Aerospace Industry Sector. SLN has been honored with National R&D Awards from Ministry of MSME, Govt. of INDIA, ELCINA - DUN & Bradstreet and ELCINA-EFY.

Products Domain

- Avionics LRUs
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- Software Integration Rigs (SIR)
- Ground Support Equipments ('I', 'O' Level Testers)
- Control Systems
- Instrumentation
- Electronic Modules (SRUs)

Services

- Embedded System Solutions
- Board Design Solutions
- Embedded Software Solutions
- IV&V
- Indigenisation
- Re-Engineering
- Manufacturing

Expertise

- Interfaces: Analog, Discrete, RS 232/422/485, SPILL, MIL1553B, ARINC429, ARINC717, Audio, Video, Ethernet, USB.
- Bus Architectures: PCI, cPCI, VME, VME64X, VPX, PXI, PMC, Custom Bus Architecture.
- Processors: PowerPC, DSP, ARM, FPGA.
- FPGA Design and Development.
- Software: VxWorks, Real Time Linux, LabVIEW.
- Hardware Process: DO 254, DO 160E.
- Software Process: DO178B, DOD2167A, IEEE 12207.

Certifications

- ISO 9001:2008
- AS 9100C (In Progress)
- CEMILAC Approved Design house



Cockpit Voice and Flight Data Recorder



Air Data Computer



Retrofit - Solid State Memory Module for Tape based FDR



SIR for Display and Mission Computer



ATE for Engine Control Unit (KADECU)

Contact:

Horizon, 3rd Floor, No.1, Pai Layout, Old Madras Road, Bengaluru - 560016, India

Phone : +91 80 41718881 / 41718882 Fax : +91 80 41718883; Email : sales@slntech.com; Web: www.slntech.com

been undertaken and key areas for possible cooperation have been identified. Projects have also been launched for development and characterisation of material. Various framework and umbrella agreements are on the anvil with DRDO HQs fostering cooperation in many areas. Optimistic steps on cooperation in specific areas and in synergising with international agencies, small and medium industries and academia to further the development programme are also being pursued.

GTRE is presently finalising the specification and technology requirement of a >100kN thrust class engine to be developed for the future twin engine powered Indian Advanced Medium Combat Aircraft (AMCA). This engine development programme and subsequent production will be pursued in collaboration with a reputed international engine house. The partnership is expected to bridge the technology gap for a state of art engine with complete know how and know why transfer to GTRE, DRDO & HAL. The other programmes on the anvil include a low thrust engine.

What are your thoughts on Aero India 2013 and the capabilities you are showcasing in this mega Bangalore event?

The Aero India shows have always been an incredible opportunity for interactions and keeping oneself abreast with current trends. We will also be displaying a Kaveri engine prototype along with some of the technology-intensive components developed indigenously.

What's the latest on the Kaveri engine? GTRE's association with LCA Tejas programme?

GTRE has so far developed 9 prototypes of Kaveri engines and 4 prototypes of Kabini (Core) engines. The engines have run cumulatively for over 2200 hours at ground and altitude conditions for various requirements including performance, operability, endurance, environmental etc. Further endurance testing is under progress at GTRE. Two major milestones achieved viz. successful completion of Official Altitude Testing (OAT) and completion of first block of flights of Kaveri engine in Flying Test Bed (FTB) have demonstrated the technological capability and maturing of the indigenous efforts.

A Kaveri engine prototype was integrated with IL-76 aircraft at Gromov Flight Research Institute (GFRI), Russia and flight tests have been successfully carried out. Issues required to be addressed have been identified and are being addressed and it is planned to commence flight trials for technology demonstration of Kaveri engine with LCA Tejas Mk-I in about three years time.

Aerospace Engineers set to conquer new heights



R Sundar
CEO, Aerospace Engineers

Aerospace Engineers is a precision aerospace parts manufacturing industry certified with AS9100C. Its elaborate and accurate technical testing devices authenticated with systematic documentation have earned it the approval of Defence Research & Development Organization. With steady growth, expansion and diversification, Aerospace Engineers commands a strong presence in the manufacturing of Precision Metallic parts and Non-Metallic parts. The company also has vibrant businesses in the manufacturing sector.

The firm is now a developer of critical, high precision aircraft components and global Supplier in the aerospace, and Defence.

This constructive growth has strengthened the firm's underlying values of entrepreneurship and innovation and now it is powered by SAP By Design implementation. Using the latest CNC technologies, Aerospace Engineers turns and mills precision components from a comprehensive range of aerospace within the most exacting tolerances has manufactured about 5,000 parts that comply with global aviation requirements with rigorous quality standards drawn up for themselves which are certified by the airworthiness authorities like DRDO & DGAQA.

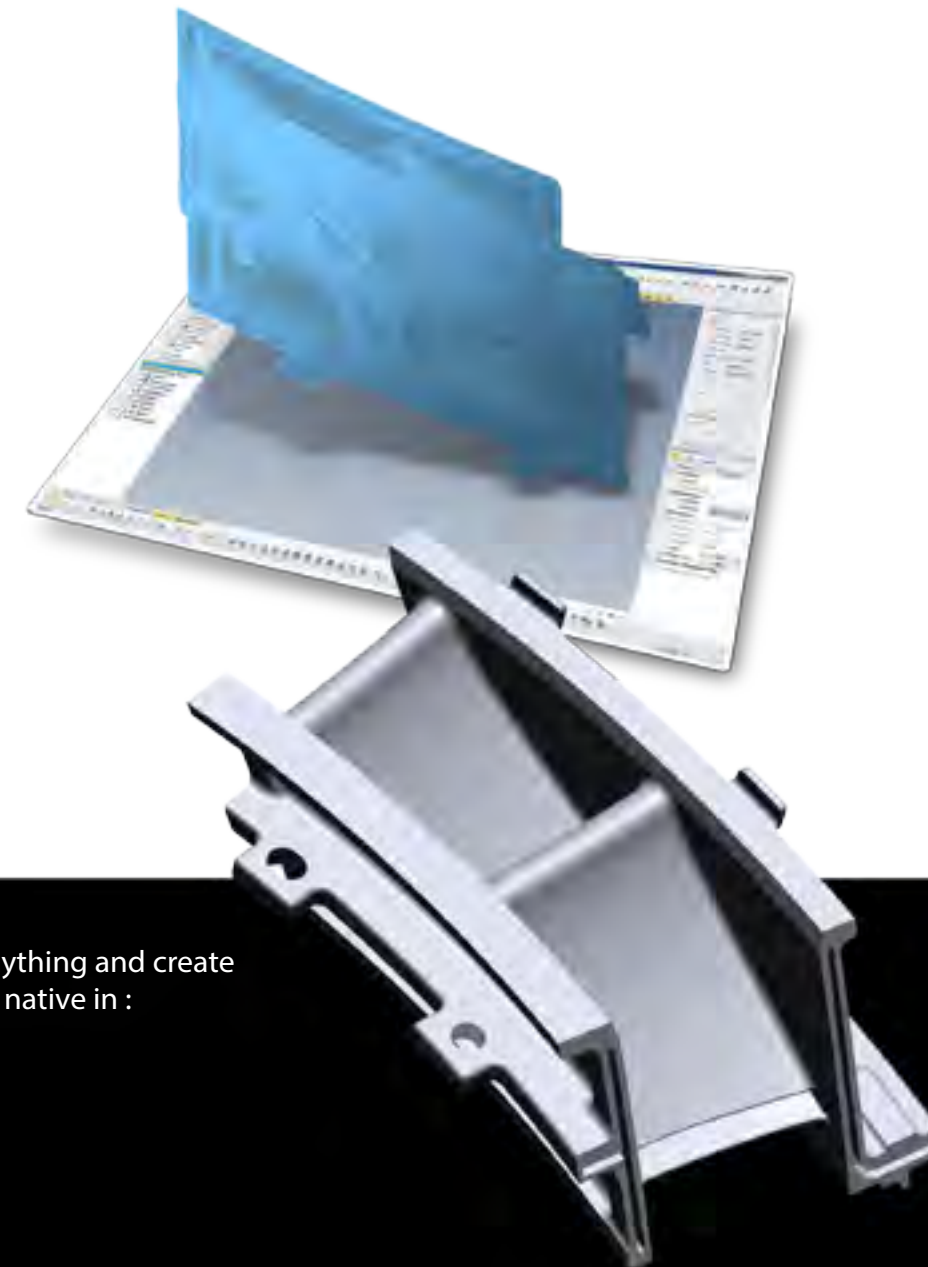
The primary focus is to enhance customer value by making aircraft safer, more reliable and more cost-effective through unique capabilities. As a manufacturer the company offers choices to customers through which they can take delivery of their components – including kitting, kanban, consignment stocking and direct line feed supply – allowing them to simplify their supply chain logistics.

Aerospace Engineers operates in two segments, the Precision Parts Division - Group (PPD) and the Non-Metallic Manufacturing Group. The PPD Group designs, engineers, manufactures, repairs, distributes and overhauls, and today Aerospace Engineers components are in the Main Gear Box as, Lube oil Pumps, filter systems, rotors, Hydraulic & Pneumatic systems, Interiors and engines flying on many of the world's most advanced Helicopters, Aircrafts & Missiles.

The company has the technical expertise and machines to manufacture most 'made to print' specialist parts or simple assemblies and a comprehensive range of standard aviation grade components. The range of CNC machines gives the firm the capability to handle most manufacturing processes, from simple turning to complex 5-axis milling, in all aerospace grade metals and Elastomers (Rubber & Plastics).

Aerospace Engineers offers Design, Development, Precision Manufacturing, Assembly, Certification, Supply and Integration of Systems and Implementation of projects. To emerge as global brand Aerospace Engineers has established one of its wings in Dallas. The participation of Aerospace Engineers in the NADCAP training programme proves its commitment to improvement and excellence in special process. Its pursuit for perfection is reflected in the establishment of NABL accredited Laboratory in the new plant launched recently.

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Sea planes business has good scope in India



M. Balaraman
Director- Business Development
Millennium Aero Dynamics Pvt Ltd



Domestic requirements for sea planes in the next decade are conservatively estimated to be around 100 to 150. Potential for Amphibious seaplanes exists in both civil and defence sector - in terms of connectivity to remote islands, transportation of tourists to luxury resorts etc. Experts from the National Design and Research Forum (NDRF) that is engaged in research work pertaining to aerospace for years now believe it would help immensely naval operations, especially to the coastal police and Coast Guard etc. Leasing the sea plane is proved to be more economical as compared to helicopters transporting people. Sea planes in

19-seater class which have a maximum range of over 1500 km are more suitable for inter-island hops or operations around a base in far flung regions for payload dropping of every intermittent distance. Canadian firm Viking Air's 19-seater Twin Otter operating in the region of Maldives demonstrates this success story.

India with varied terrains like high mountains, deep valleys, coastal plains, rivers and streams, large water bodies like brackish water, lakes and rivers (providing scope for inter connectivity) that lie inland from the coastal regions provides immense scope for sea plane operations. Manufacturers like Dornier, Viking and Russia BE 200 Jets have endorsed this potential.

Amphibian sea plane:

A sea plane is powered fixed-wing aircraft capable of taking-off & landing on water. Sea planes that can also take off and land on airfields are a subclass called amphibian aircraft. Sea planes and amphibians are usually divided into two categories based on their technological characteristics-float planes and flying boats as illustrated below.

Manufacturing opportunities

Pawan Hans Helicopters Limited started the country's first sea-plane operations -- Jal Hans -- in Andamans and Nicobar Islands. It is perceived that after general aviation and helicopter operations, there is scope and phenomenal growth for sea plane operations in India.

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New Patented Technology by Australian company - Tigerfish Aviation Pvt Ltd



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Leading Edge Infotech's (LEIT) vision is to be a globally respected business partner for the national security, defence and aerospace industry.

Our mission is to be a partner of choice for national defence technology deployment and manufacturing initiatives; and critical risk-sharing partner for global OEMs.

LEIT supported by United Telecoms Limited (UTL) Group has financial and human resources required for setting up large industrial manufacturing eco-system. This eco-system once created will be capable of undertaking nurturing multitudes of technologies pertaining to various segments of the aerospace industry.

UTL Group Companies:



Our Strategic Partners:



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- Engineering Services
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- Dynamic Rotor Vibration Analysis
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Product Offerings:

- Military Communication Systems
- Battlefield Management System
- Night Vision Systems
- Electronic Warfare Systems
- Forward Air Controller
- Laser Target Designator - Army and Air force
- Communication Interface Units
- Micro UAV- Casper-250
- Mini UAV- Tracker

LEIS Leading Edge Infotech Limited
(A group company of Trigyn Technologies)

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Trigyn Technologies Limited: Unit 27 SDF-1, SEEPZ, Andheri (East), Mumbai 400096, INDIA. Email: indiainfo@trigyn.com

United Telecoms Limited: #18A/19, Doddanekundi Industrial Area, II Phase, Mahadevapura Post, Bangalore -48, Email: info@utlindia.com

Pushpak going from strength to strength

A decade-old Pushpak Products India Pvt. Ltd. has established itself as a service provider to major aerospace companies and its clients include some multinational firms. An ISO 9001:2008 company, started in 1992 by C.S. Prakash, the Managing Director, its strength lies in:

- Engineering Division- Manufacturing of Ground Handling Equipments.
- Electrochemical Division- Anodizing and Gold Plating on Spacecraft Onboard Components.
- Furniture Division- Modular Furniture and Seating Systems.



C S Prakash
Managing Director, Pushpak

Pushpak is providing services to HAL, ISRO, NAL, BEL and BHEL for various programmes including LCA, ALH and Kaveri Engine. Multinational companies like Toyota Group, Bosch, L & T and Volvo are also part of the company's client network. It is qualified and certified anodizer for ISRO.

Pushpak is the first and only company to get the approval from DGS&D for rate contract for all defence and central government projects. The company has grown through hard work and commitment of experienced professionals and skilled workers. With a work force of around 100 employees it has three factories in Nelamangala, Jalahalli and Bidadi. The company has already purchased land at Devanahalli Aerospace Park developed by Karnataka government, to provide more services to Aerospace Divisions.

Pushpak has already entered into joint venture with Liko-S, Czech Republic. Also the company is shortlisted by IKEA and Saint-Gobain Global for their global requirements. The association with other international business partners has led to diversity in operation. The company is scouting for joint venture partners to enhance its business in aerospace sector.

Products designed and developed are customer specific and have led to considerable R&D work and the company had secured the National Award in 2008 for outstanding Research & Development efforts in MSME sector and three National Awards in 2009 for outstanding Research & Development and outstanding entrepreneur efforts (manufacturing & services) in MSME sector from MSME, Govt. of India. The company has received the prestigious CII- EXIM Bank Business Excellence award (EFQM Model) for 2012.

Retractable Amphibious Pontoon Technology – RAPT

RAPT is a quickly removable, retrofit, pack that fits to the bottom of the aircraft that can deploy a pair of floats for water operations and wheels for land operations. RAPT is far more efficient than traditional fixed floats and being retrofit is far cheaper to develop than a new seaplane. The first RAPT aircraft planned is the highly regarded Dornier 228 recently placed back into production. Other RAPT aircraft are planned to create a family of new seaplanes in civil and military operation.

The retracting floats reduce air drag by a massive 24% & fuel consumption by approx 20%

Way forward

Production and after sales support will ideally be located in India - to develop its aerospace industry, and that has good access to a region where sea planes will be significant. Millennium Aero Dynamics Pvt Ltd – a result oriented Company will drive the programme / coordinate with IIAAT (a State Government Establishment under the Ministry of Science, Technology & Education of The Russian Federation) vis-à-vis its existing collaborative arrangement for promotion of Pelicans.

With Tiger Fish Aviation Pvt Ltd for development, integration, testing and certification of RAPT, Investors are invited to consider joining the program.

Millennium's with its wide network is confident of promoting the products discussed and would facilitate discussions on way forward in terms of ToT /Licensing, Investment, deliverables (such as Hardwares / softwares, documentation etc.,) while rendering after sales / warranty support being its core competency.

Boeing to showcase range of advanced capabilities at Aero India 2013

Boeing will showcase a broad range of aerospace capabilities at the upcoming Aero India 2013 show, to be held Feb. 6-10 at Air Force Station Yelahanka in Bangalore.

Boeing's exhibit in Hall E will feature commercial and defense products and services of interest to India, including a P-8 mobile console, a Maritime

Surveillance Aircraft console and a Virtual Maintenance Training Demo.

Product models will include the Boeing 787 Dreamliner, 777-300ER (Extended Range) and 737 MAX commercial airplanes, as well as the C-17 Globemaster III strategic airlifter, P-8I maritime reconnaissance and anti-submarine warfare aircraft, AH-64D Apache attack helicopter,

CH-47F Chinook heavy-lift transport helicopter, and V-22 Osprey tiltrotor aircraft.

Boeing subsidiary Insitu will display full-scale models of the ScanEagle and Integrator unmanned aerial vehicles in the Boeing exhibit.

A C-17 Globemaster III military transport will fly at the show and go on static display for visitors.



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- Oil Seals
- O-Rings & Gaskets
- Y-type Fittings
- Hydraulics Tube Fittings
- MBBN Type
- Precision Metallic fittings
- Flame Proof Silicone based Connectors & Hoses.

Technology to dominate Rolls-Royce presence at Aero India 2013

Rolls-Royce, the global power systems company, will highlight the use of its innovative technology to enhance customer capability at the 9th Aero India in Bangalore from February 6th-10th, 2013. The Rolls-Royce stand (B4.3 in the UK Pavilion) will showcase its iPad-based services technology for the first time at the show and feature the Adour Mk871 engine, which powers India's latest Hawk Advanced Jet Trainer (AJT), and the CTS800 helicopter engine.

Kishore Jayaraman, President, Rolls-Royce India, said: "Aero India is a significant platform for us in the continuing development of our business. India is an important market for Rolls-Royce with a number of significant local partners. We look forward to accelerating our business development and partnership initiatives

as we work to further contribute to India's defence modernization goals."

John Gay, Senior Vice-President — Defence Aerospace, South Asia, Rolls-Royce, said: "It is a pleasure for us to be a part of Aero India, which gives us a platform to showcase our technology and products and has been an enabler for exchange of innovative ideas. Rolls-Royce is proud to have powered the Indian armed forces for 80 years. 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 on the stand will enable visitors to gain a new insight in to 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 the company's expansive services capability and offer visiting customers analysis of how initiatives such as fuel management may help to improve operational performance and reduce costs.

The Adour Mk871 engine powers the Indian AJT and is assembled and tested in India by Hindustan Aeronautics Limited (HAL), an example of a partnership between the two companies that has now flourished for 57 years.

The CTS800 engine is designed and developed by the Light Helicopter Turbine Engine Company (LHTEC), a 50:50 partnership between Rolls-Royce and Honeywell. It has passed 100,000 in-service flight hours and demonstrated proven technology and reliable performance in a variety of demanding operational environments.

EADS plans major presence at Aero India 2013

EADS and its Divisions – Airbus, Astrium, Cassidian and Eurocopter – will display a broad selection of cutting-edge products, technologies and services at Aero India 2013 from 6 February to 10 February 2013 at the Air Force station, Yelahanka, Bangalore.

EADS will present the following models and exhibits:

Airbus Military: a mock-up of the MRTT and of transport aircraft Astrium: satcom terminal and telecommunications satellites Cassidian: UAVs, sensors, defence electronics and avionics systems Eurocopter: a range of helicopters including a Naval Panther outside the pavilion ATR: a mock-up of ATR 72-600

At the EADS pavilion in front of the entrance to Hall C, there will be a dedicated HR Corner where EADS and its Divisions will present their growth plans and welcome Indian candidates interested in careers within the Group.

Yves Guillaume, CEO of EADS India said: "Since the 1960s, we have offered technical and operationally superior equipment and systems to the Indian Ministry of Defence. EADS is also very strong in the commercial aviation sector through Airbus, Eurocopter and ATR and in space sector with Astrium. We are leaders in this market and intend to remain so."

MBDA and Eurofighter are represented through separate stands to present their range of products and systems.

LM eyes naval multi-role helicopter contract in India

Lockheed Martin is excited that the Indian Air Force continues to expand the role of the C-130J in Special Operations. The C-130J is a proven, reliable, and flexible air-mobility platform. The company continues to work with other defence agencies in India to develop air mobility solutions using the C-130J platform.

Lockheed Martin is prepared to scale up to market demands as necessary in India. In addition to the C-130J, Lockheed Martin along with its TEAM SEAHAWK (TS) industry partners is currently active in the inquiries for upcoming Naval Multi-Role Helicopter request for proposal (RFP). We are confident the TS solution provides the best proven maritime helicopter that is operational today. In addition to the United States Navy operating both the MH-60R (Romeo) and the MH-60S (Sierra) helicopters, the Navies of Australia, Denmark and Thailand operate these helicopters.

In addition to LM's sale of C-130J aircraft, LM is currently looking to compete in the follow-on Naval Multi-Role Helicopter competition along with its TS industry partners. TS looks forward to showcasing the MH-60R and MH-60S to the Indian Ministry of Defence and the Indian Navy. The MH-60R is the most capable maritime helicopter available and conducting real world operations today. Complemented by the MH-60S, these two platforms bring the full spectrum of capability required by today's international Navies. Currently, LM Aeronautics is focused on the C-130J platform and its variants for meeting India's air mobility requirements. The company expects to offer these to multiple agencies within the Indian defence establishment as their requirements mature.



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