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to open ILA 2014**



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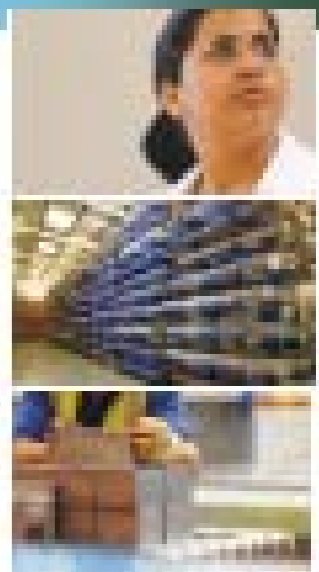


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EDITORIAL



India was the partner country for ILA Berlin Airshow in 2008, when India's honorable Defense Minister was the Guest of Honour. Indian industries and delegates participated in the ILA Berlin Airshow 2008 and the subsequent events in 2010, and 2012 and now in 2014. While there are several airshows & exhibitions in several regions of the World, the ILA Berlin is unique in a way that it's focus

is more on supply chain development. It is one of the largest show casing of components, structures, equipments & systems manufacturers for aerospace and where major world leaders in Manufacture of Aircraft, Helicopter, Engines, & MROs participate to interact with suppliers. The International suppliers centre and conference facilitates B to B meetings with buyers and suppliers of components / structures / equipments & systems. Government of India introduced offset policy in Aircraft & Defense procurement and have encouraged the overseas suppliers of Aircraft / Defense equipments to facilitate co-operation between their Tier one and Tier two suppliers and Indian SMEs & other private sector industries and provide significant incentives for such collaborations. For example investment in such collaborations and export from the SMEs will qualify for 'Offset Credit' with a multiplication factor of X 1.5. Also the overseas companies will have the added advantage of lower infrastructure and labour costs and enhance their own profit margins in addition to expanding their market. India has a robust and growing military & civil aircraft / equipments manufacturing under license / TOT, as well as design & development of several advanced helicopters, trainer & fighter aircraft commercial aircraft, engines & equipments. There is considerable potential for mutually rewarding international co-operation.

On behalf of SIATI and Aeromag, we extend best wishes for all participants to the Berlin Airshow for useful meetings & discussions with the Indian participants & delegates to develop mutually gainful strategic collaborations.

Warmly,

Dr CG Krishnadas Nair
Honorary President, SIATI



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Contents

Page **20**

CAE using COMSOL
Multiphysics

Page **24**

Eaton awarded Channel
Champion 2014 by CRN

Page **30**

Eurofighter Typhoon -
20 Years Strong

Page **32**

ISRO going from
strength to strength

Page **34**

MiG-29 fighter: from
stagnation towards prosperity

Page **36**

Additive Manufacturing: Creative
scope to design for gripping
system components

Page **44**

Success with Precision

Page **48**

Airbus launches new ACJ319
corporate jet

Page **54**

Unmanned Aerial Vehicles



8 Chancellor Merkel to
open ILA 2014



14 Safran A leading international
high-technology group



16 Aeromag, SIATI host
A & D manufacturing
summit



43 HAL bets big on
Dhruv helicopters

Safran: India's Technology Partner



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KEY MISSIONS, KEY TECHNOLOGIES, KEY TALENTS



Chancellor Merkel to open ILA 2014



This year's most important aerospace trade show in mainland Europe, taking place from 20 to 25 May, will be attended by some 1,200 exhibitors from 40 countries, who will be presenting advanced technology and hi-tech products from every sector of the aerospace industry. The organisers expect this event to again attract over 200,000 visitors, more than half of them trade visitors from Germany and abroad.

The ILA venue, Berlin ExpoCenter Airport, covers an overall area of some 250,000 square metres, of which around 50,000 square metres is occupied by halls, chalets and pavilions, with 100,000 square metres reserved for aircraft displays, and a further 100,000 square metres for spectators and for logistical purposes. The ILA will also feature some 60 conferences. These high profile meetings will be attended by leading figures from the industry and will focus on strategically important trends and new commercial developments.

The ILA has a great deal to offer, not only on the ground but also in the air: visitors will be fascinated by as many as 300 aircraft of all sizes and categories, and from every period in the age of flight, from classic aircraft to the very latest technology demonstrators. One of the highlights of the ILA will be provided by an ultra-modern, long haul aircraft, the A350 XWB, which is making its debut here.

The ILA 2014 is open daily from 10 a.m. to 6 p.m. For the first three days (20 – 22 May) admission to the ILA will be restricted to trade visitors only. The public will be admitted over the weekend (23 – 25 May), when enthusiasts will be able to enjoy a fascinating flying display that brings over 100 years of aviation history to life. First held 105 years ago, the ILA is the world's oldest aerospace trade show, and the one with the longest tradition. It is organised by the German Aerospace Industries Association (BDLI) and Messe Berlin GmbH. The ILA 2014 will be officially opened on 20 May by the Federal Chancellor Dr. Angela Merkel during her tour of the event.

Dietmar Schrick, managing director of the BDLI: "In a constantly changing sector, characterised by the vigorous expansion of civil aviation, the ILA reflects the dynamic, global development and innovative strengths of this industry. With sections devoted to individual business activities in aviation and space, it covers the entire spectrum of this advanced and forward-looking industry. The way it presents space flight is truly unique, and it also deals with other civil and military areas in their entirety. We are particularly pleased that this year, 25 years after the Berlin Wall came down, the ILA is providing a shop window for the twelfth time here in Berlin-Brandenburg for the achievements of the aviation and space industries. We extend a special welcome

to the Republic of Turkey, which is the partner country of the ILA this year."

Stefan Grave, director of the ILA for Messe Berlin GmbH: "Preparations are in full swing for the ILA. At this very moment a 'trade show city' is being erected at Berlin ExpoCenter Airport, complete with all the necessary services and facilities, and the industry-specific infrastructure needed to stage this major event. Among trade shows an air show is certainly not only spectacular but also requires the highest degree of organisational skills. With its ultra-modern infrastructure and a remarkable degree of flexibility, this new venue is ideally suited for meeting the ILA concept, which features a number of specialised sections. And the benefits are felt not only by the exhibitors, trade visitors and the general public, but also by the entire Berlin/Brandenburg region."

At different times during the course of the ILA aircraft of all sizes and categories and from every era of aviation development can be seen on the ground and in the air. During the trade visitors' days these will include two of the latest commercial aircraft, the Airbus A350XWB and Boeing 747-8, the most modern European military transporter, the A400M, and the Antonov An-124, the largest production transport aircraft in the world. Airbus Group is presenting an all-electric, experimental demonstration aircraft, the two-seater E-Fan, to the German public for the first time at this year's aerospace

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German Chancellor Dr. Angela Merkel at ILA 2012



exhibition ILA.

With the Patrouille Suisse (7 Northrop F-5E Tiger II) and the German debut of the Breitling Jet Team (8 L-39C Albatros), the programme for the public features two internationally renowned teams this year. The organisers of the ILA are expecting several solo demonstrations of a wide range of combat aircraft, including a MiG-29, an F-16 and the GRIPEN.

As in previous years the US Air Force is particularly strongly represented by, among others, the Lockheed Martin C-130 J Hercules transporter, the C-17 Globemaster III that was named 'Spirit of Berlin' by the then US President Bill Clinton just before the start of the ILA 1998 to mark the 50th anniversary of the Berlin Airlift, the Boeing UH-60L Black Hawk and Boeing Apache AH-64D helicopters, and the Lockheed Martin F-16 combat aircraft. The highlight of the presentation by the German armed forces, the Bundeswehr, is provided by 'Willfire 2014', with a remarkable combination of flying skills. Four Tornados, two Eurofighters, two Tigers, one CH-53, one Transall and the Airbus A310 MRTT tanker will be in the air together for approximately 20 minutes in an impressive display of military cooperation.

Unmanned aircraft for civilian and military use, business and touring aircraft, technology platforms, training and sports aircraft, powered and unpowered gliders, as well as ultralights: the ILA 2014 provides a comprehensive range guaranteed to make the heart of any aviation enthusiast beat faster. The exhibits also include some 25 historic aircraft such as the Messerschmitt M 17, the first powered aircraft to be designed by the aviation pioneer Willy Messerschmitt in 1925, which weighed just 198 kilograms; the

Me 262 (maiden flight 1942), the first production jet aircraft; the propeller-driven STOL (Short Take-Off and Landing) Fieseler Storch (Stork), so named on account of its long undercarriage, which first flew in 1936; and the Noratlas, a twin-engined military transporter known as the 'Flying Boxcar' on account of its compact fuselage, which made its first flight in 1949.

The Republic of Turkey is the official partner country of the ILA 2014. Situated where Europe meets Asia, it is an attractive and ambitious market for companies in the aerospace industry. The civil aviation market in Turkey began a period of rapid growth with the liberalisation of the country's aviation sector in 2002. Annual growth rates of up to 30 per cent have been well above the international rate for aviation of approximately five per cent. A NATO partner, Turkey has been represented at the ILA for many years and, in its role as the partner country at this year's event, will be staging its largest display ever, featuring its capabilities in both the civilian and military fields. In Hall 6 at the ILA the exhibitors, Turkish Aerospace Industries (TAI), ROKETSAN, HAVELSAN, TUBITAK – the Research Institute for Space Technology, TURKISH AIRLINES (THY), FIGES Engineering und Defence and Aviation Cluster (OSSA) and the Aerospace Clustering Association, will provide evidence of an impressive industrial capability and the outstanding research and development skills to be found in this sector. High-ranking Turkish delegations representing politics, industry and the military are expected to attend.

The ILA 2014 will provide the venue for a meeting of the leading representatives of

the space industry at a national, European and international level. The outstanding presentation of all kinds of space-related topics including launcher systems, space flight applications, and manned space flight and exploration is truly unique. The 1,500 square-metre ILA Space Pavilion forms the focal point of the space flight presentation. It has been designed jointly by the European Space Agency (ESA), the German Federal Ministry of Economics and Energy (BMWi), the German Aerospace Centre (DLR) and the companies organised under the project management of the German Aerospace Industries Association (BDLI). This will be an opportunity for guests from all over the world to experience the fascination and the applications of space flight. It will feature German and European space programmes.

Among the main aspects of the exhibition are the continuing improvements that have been made to the European launcher, the Ariane 5 ME, the European communications satellite Alphasat that was successfully placed in orbit in the summer of 2013, and the latest achievements in earth observation. On the Astronauts' Day, 23 May, the German ESA astronaut Alexander Gerst is also expected to be present. Shortly after the ILA he will be taking off on his first mission to the International Space Station ISS. The display area immediately adjacent to the Space Pavilion, occupied by national and international space flight companies and institutions, provides evidence of the significant expansion of this sector at this year's ILA. In addition to the German space industry the German Aerospace Centre (DLR) will be staging a high profile display that also gives an opportunity for various international research partners to

organise their own presentations.

As the largest individual exhibitor at the ILA 2014 the German armed forces, the Bundeswehr, are presenting their capabilities in a wide-ranging display. Germany's armed forces are using the trade days and the public days at the ILA 2014 as a means of showing the Bundeswehr and its deployment as a modern army, and also as an employer. On an open air area covering more than 10,000 square metres the Bundeswehr is providing the latest details about the armed forces, together with an extensive display of products. These include five combat aircraft (Eurofighter, Tornados), three other fixed wing aircraft, nine helicopters, a ground-based air defence system (Patriot), four drones (reconnaissance systems used by the army and the joint support service) and a sick bay module.

With a display area measuring more than 1,000 square metres in the so-called 'Operations Pavilion' in Hall 3, the Bundeswehr and military aviation industry are demonstrating how they cooperate successfully to ensure that all Bundeswehr aircraft are fully operational at all times. At the Static Display mobile career information centres and aircrew will be on hand to advise visitors about military and civilian careers in the Bundeswehr. Also among the attractions is a Bundeswehr quiz, offering attractive prizes.

The German Aerospace Centre (DLR) has one of the largest displays by any institution at the ILA 2014. With presentations of research aircraft on the Flightline, and the latest aerospace research results on a stand measuring some 700 square metres in Hall 4, in the Space Pavilion and at the ILA Career

Centre, the DLR is providing details about the work that is being carried out to acquire the knowledge that will be needed in the future.

The A320 ATRA and the EC 135 ACT/FHS can be seen for the entire duration of the ILA. Both of these aircraft are being used to demonstrate the research that is being carried out in the fields of aerodynamics, aviation systems technology and cabins for the fixed wing aircraft and the helicopters of tomorrow. The ACT/FHS Flying Helicopter Simulator is based on a production model of the Eurocopter EC 135, which has been substantially modified to enable it to be used for research and experimental purposes. The mechanical controls, for example, have been replaced by a fly-by-wire/fly-by-light control system (FBW/FBL). Instead of control rods the commands are now transmitted using electrical cables and fibre optic cables. There are also plans for other research aircraft, which are currently en route to carry out various missions, to stop over in at the ILA in order to present aspects of the research work that is taking place to make the aviation of the future more eco-efficient. The DLR is represented in the Space Pavilion by more than 20 missions and projects from all areas of space flight. The DLR also plans to introduce a new kind of robot, 'TORO'. Whereas other robots are generally designed to move around in a known environment according to planned instructions, the purpose of 'TORO' is to develop other talents, with the ability to act independently, flexibly and safely in new and unknown surroundings.

Major advances continue to be made with alternative fuels for use in aviation. At the ILA 2014 leading representatives of the bio-fuels industry and the air

transport sector are meeting at the Alternative Aviation Fuels Pavilion (AAFP) in Hall 2. New commercial products and developments, innovative joint ventures and the latest technology from all over the world form the main focus of the combined stand organised by aireg – Aviation Initiative for Renewable Energy in Germany.

Manufacturers of bio-fuels from the USA, France and Brazil will present market-ready alternatives to fossil kerosene, including Amyris, a new technology that enables sugar cane to be used as a raw material, and Solena, a process being conducted jointly with British Airways in London to obtain kerosene from the city's refuse. The aireg initiative was established in 2011 through the combined efforts of companies and organisations in industry, research and science. Its aim is to encourage the development and use of alternative, regenerative liquid fuels such as bio-fuels, thereby helping to meet the ambitious aims of reducing the CO2 emissions from aviation.

Throughout the world unmanned aircraft systems (UAS) are the aerospace sector that is undergoing the fastest and most vigorous expansion. The ILA 2014 is responding to this situation with a special section focusing on UAS and with specialist conferences that will be attended by leading figures in this field. The larger UAS, designed primarily for military deployment, will be displayed on the central ILA Plaza. Turkish Aerospace Industry (TAI) from the partner country of this year's ILA, Turkey, is exhibiting ANKA, a medium-altitude, long-endurance (MALE) UAS system. Airbus Defence & Space will be presenting its entire range of UAS products at the ILA. Elektroniksystem- und Logistik-GmbH



Strong US participation at ILA 2014

NASA administrator Charles Bolden a guest of the ILA for the first time

For the exhibitors from USA, the Berlin Air Show is the leading aviation exhibition in mainland Europe. The Americans regard this event as an ideal platform for US companies to secure partners and customers from around Europe as well as to establish contacts and do business. Accordingly, US participation in the halls, the outdoor display area and the programme of flying displays is high.

Leading US defence companies will be represented in Hall 6, among them General Atomics, Aeronautical Systems and Sikorsky, as well as specialist manufacturers FLIR Systems and Teledyne Controls. Raytheon will be represented with its own chalet. According to Pratt & Whitney, in future every repair and maintenance company will be able to manufacture its own replacement parts using 3D printing, which is an additive process. Visitors to ILA 2014 can already find out about Pratt & Whitney's new turbofan engine family. They include the Pure Power PW1100G-JM, which has been chosen by Lufthansa to power an additional 30 models of the Airbus A320neo as of April. In addition to regular exhibitors there will also be interesting newcomers such as Infinity Air, a parts supplier.

As in previous years, numerous aircraft will also be representing the US Air Force. They include a Lockheed Martin C-130 J Hercules transport aircraft, as well as a C-17 Globemaster III, which was christened the 'Spirit of Berlin' just before ILA 1998 to commemorate the fiftieth anniversary of the Berlin Airlift, a Boeing UH-60L Black Hawk and Boeing Apache AH-64D, both helicopters, and a Lockheed Martin F-16 fighter jet.

At this year's event NASA administrator Charles Bolden will be a guest of the ILA for the first time. On 20 May he will be presenting a new transatlantic joint venture of the space industry. In the afternoon Jean-Jacques Dordain, director general of ESA, Charles Bolden, administrator of NASA, Johann-Dietrich Wörner, CEO of DLR, and Evert Dudok, vice-president, Space, of BDLI will

be taking part in a high-level panel discussion in the Space Hall.

Aerospace coordinator Zypries opens ISC

Debut for 'Selective Laser Melting Technology' and special 'Innovative Precision Parts Manufacturing' show

Three Buyers' Days with more than 1,000 discussions with clients

On 20 May at 9.15 a.m. the Federal Government's Coordinator for German Aerospace, Brigitte Zypries, will open the International Suppliers' Center (ISC) in Hall 1 at the ILA 2014. The 330 exhibitors from 27 countries will occupy a total of 6,000 square metres of hall space. Now a regular component of the ILA Berlin Air Show, the ISC has become established as the central marketing platform for the entire supply sector. It provides a market place designed to meet the specific requirements of companies representing every product group in the aerospace sector.

Among the exclusive features available to exhibitors at the ISC are the three International Buyers' Days, when discussions can take place between clients and major OEMs and first-tier suppliers. Some 75 outstanding representatives from the purchasing sector and from research and development have announced their intention of attending this event. In advance of the trade show they have already made over 1,000 appointments with exhibitors at the ISC.

The ILA 2014 will be taking place from 20 to 25 May at Berlin ExpoCenter Airport. The ISC, in Hall 1, will be open exclusively during the three trade visitors' days, from 20 to 22 May.

High tech products and the latest technologies will be among the exhibits at the ISC. For example, SLM Solutions, one of the leading providers of metal-based additive manufacturing systems (also referred to as 3D printing), is introducing its selective laser melting technology for the first time (Hall 1, Stand 1806). The presentations will feature the latest developments and applications of additive manufacturing technology for the aerospace market. SLM Solutions is displaying the selective laser melting system SLM 280HL in Berlin.

(ESG) is presenting its unmanned mission equipment platform (UMAT), which is already being successfully used to trial UAS and avionics systems. Germany's armed forces, the Bundeswehr, will be represented on the static display with its UAS systems ALADIN, KZO and LUNA, which have been operating highly effectively for several years.

Attention is also focussing on smaller UAS, mainly for civilian use. A dedicated area in Hall 3 features the latest products, services and research findings from 18 UAS manufacturers, service providers and research institutes. UAS have a wide range of applications, from remote sensing of large and inaccessible areas to reconnaissance and support in the event of disasters, as well as the monitoring of important infrastructures with combined UAS systems, and the broadcasting of sporting events. Demonstration flights during the trade visitors' days

will provide an overview of the range of applications and the capabilities of smaller UAS. The demonstrations will be provided at the most westerly end of the ILA site.

Aviation and space flight is a high tech industry employing highly qualified specialists, engineers and scientists. The search for suitable new employees, together with their training and advanced training, form an important aspect in the efforts to equip this innovative, worldwide industrial sector to face the future and maintain its competitiveness. It is against this background that the ILA 2014 invites all interested pupils, students, graduates and young professionals to visit the ILA Career Centre in Hall 5.

For two days at the ILA (Friday, 23 and Saturday, 24 May) civilian and military aerospace employers will be providing details about some of the attractive careers and the many

employment opportunities offered by this advanced technology. The ILA Career Centre is the largest job centre for the aviation and space industry in Germany. Following intense demand in recent years this successful section, with its exhibition stands, conferences, papers, panel discussions and workshops, is now taking place for the fourth time.

The International Suppliers' Centre (ISC) is now firmly established as a central marketing platform for the entire supply sector at the ILA. It provides a market place designed to meet the specific requirements of companies representing every product group in the aerospace sector. The ISC is open during the three trade visitors' days, from 20 to 22 May. Due to the success of the International Buyers' Days, introduced at the ISC 2010, this feature has been extended and is being held on all three days of the ISC.

Safran

A leading international high-technology group



Safran is a leading international high-technology group with three core businesses: Aerospace (propulsion and equipment), Defence and Security. Operating worldwide, the Group has 66,200 employees and generated sales of 14.7 billion euros in 2013. The Group invests in Research & Development to meet the requirements of changing markets, including expenditures of 1.8 billion euros in 2013. Working alone or in partnership, Safran holds world or European leadership positions in its core markets.

The Group comprises the following companies: Aircelle, Herakles, Hispano-Suiza, Labinal, Messier-Bugatti-Dowty, Morpho, Sagem, Snecma, Techspace Aero, Turbomeca.

Aerospace:

Safran develops, produces and markets engines and propulsion systems for civil and military airplanes and helicopters, ballistic missiles, launch vehicles and satellites. It also provides a wide range of systems and equipment for civil and military airplanes and helicopters.

Defence:

Operating in the optronic, inertial guidance, electronics and safety-critical software markets, Safran offers today's armed forces a complete range of optronic, navigation and optical systems and equipment for use in the air, on land and at sea.

Security:

As a pioneer in identification and detection systems, and a major player in smart cards and e-documents, Safran offers state-of-the-art solutions to meet the evolving security requirements of individuals, businesses and governments.

Safran in India

Safran has been associated with India over 60 years and is committed to be an integral part of India's growth and development in the aerospace, defence and security industry. With 2600 employees, it has the highest number of employees for the company in Asia.

Over decades of association with India, Safran has become a trusted partner addressing India's vital Aerospace, Defence and Security concerns. Working with cutting edge technology, and through industrial co-operation, Safran collaborates with Indian companies to achieve the long-term goal of creating an indigenous, self-sustaining aerospace, defence and security industry.

Safran – Revving up the Presence in Indian Aerospace Sector

Safran is the leading supplier of aircraft engines, landing gear and carbon brakes for airlines operating in India and neighbouring countries, and plays a full-fledged role in the development of air transport in the country. Safran activities have quickly evolved to include strong local partnerships with Indian aviation industry based on joint developments, production and support licenses for airplane, helicopter (including the Shakti engine for the Dhruv Helicopter) and rocket engines landing gear, navigation systems, as well as the associated support services.

Today, Safran has four facilities dedicated to products and services for fixed and rotary-wing aircraft:

- Safran Engineering Services India (SESI) in Bengaluru provides end-to-end engineering services to global and local customers. It

embodies Safran's proven expertise in aerostructures, electrical and mechanical systems, electronics and software.

- Snecma HAL Aerospace Pvt. Ltd. (SHAe) is an equal joint venture between Snecma and Hindustan Aeronautics Ltd. (HAL), created in 2005. It manufactures high-tech components for CFM56 aircraft engines in Bangalore.
- CFM Training Center close to Hyderabad airport provides maintenance training for ground crews from airlines operating CFM56 engines. It can provide training for up to 500 maintenance technicians and engineers a year. It also offers training to engineers from helicopter operators using Arriel engines manufactured by Turbomeca.
- Turbomeca India Engines Pvt. Ltd, Safran's helicopter engine support center in Bengaluru, provides support services for its own engines to its Indian customers. Its main partners are HAL and Pawan Hans Helicopters Ltd.

Safran provides multiple solutions for the Indian Aerospace sector:

- Over 400 CFM56 engines manufactured by CFM powering Indian aircraft.
 - The Turbomeca Arriel engine powers about 30 helicopters (AS365) for Pawan Hans Helicopters Ltd.
 - Messier-Bugatti-Dowty holds a 100% share of the domestic market for wheels and carbon brakes on A320 and B787.
 - More than 1700 Turbomeca engines power the helicopters in India (Civilian and Military) today.
 - CFM International's LEAP-1B engines will power the 42 Boeing 737 MAX aircraft ordered by Spicejet
- A Strategic Partner to Indian Defence Industry

Safran has been a supplier to the Indian armed forces since the 1950s, providing engines and/or equipment for combat aircraft, including Jaguar Mirage 2000 fighters fleets, Hawk trainers, HAL Dhruv, Cheetah, etc.

In early 2012, the consortium "Rafale International" (Snecma, a Safran company, is one of the key partners in the consortium) started exclusive negotiations with the Indian government to supply 126 Rafale multirole fighters equipped with several Safran technologies including the engine, landing gear, wiring, inertial

navigation system.

Safran, through its company Sagem, also provides a wide range of avionics (inertial navigation systems, flight control systems and autopilots) and optronics systems for a number of combat platforms including aircrafts, submarines, artillery systems and tanks.

Almost the entire Indian Air Force fleet is equipped with Sigma 95N navigation systems as a result of a long-standing partnership with HAL. Significantly, this navigation system has also been selected for the first prototypes of the MALE drone being developed by India. The New Delhi-based subsidiary Sagem Services India Pvt. Ltd. provides maintenance and customer support for these systems and equipment.

Equipping the Indian Armed Forces with a spectrum of Technology:

- Safran has provided aircraft technology for most of the Indian Armed Forces airplanes and helicopters like Jaguar, Mirage 2000, SU 30, Hawk, MiG 29K, Cheetah Helicopter and its variants.
- The Dhruv helicopter and its variants are powered by the 'Shakti' engine which was jointly made by Turbomeca (Safran) and Hindustan Aeronautics Limited (HAL).
- Safran Engines power 900 Indian combat aircraft (300 airplanes and near 600 helicopters)
- Sigma 30 Inertial Navigation System has been designed for artillery applications.
- Sagem provides the gunner main sighting system of the Arjun Main Battle Tank.
- The Sigma 40 Navigation System is used on Indian Naval Vessels
- Sagem is a leading producer of FADEC (Full Authority Digital Engine Control) systems, a critical component in aircraft like the Rafale, the A320 and B737

Advancing Biometric Security in India

- Morpho (Safran) makes Trace and detection equipment and is a leader in Biometric Technology and Identity Management and Identification systems like (AFIS) Automated Fingerprint Identification Systems and Face recognition solutions.
- A leader in Biometric Technology, Morpho (Safran), is one of the key partners in India's Aadhaar project under the 'Unique Identification Authority of India' (UIDAI). To date, more than 500 million Aadhaar cards have been issued.



Dr.K.Tamilmani inaugurating the ADMS 2014. Dr.C.G.Krishnadas Nair, Wg Cdr(Retd) Venugopal Menon, Senior Executive Officer, SIATI also seen.



Mr. Stephane Lauret, CEO, SAFRAN India Pvt Ltd lighting the lamp at ADMS. Dr. Mike Hennell, Mr. Sunny Jerome, Air Cmdr. (Retd) Joseph Varkey, Mr. Venkata Subramaniam, CEO, System Aids also seen.

Aeromag, SIATI host A & D manufacturing summit

Aeromag and Society of Indian Aerospace Technologies and Industries (SIATI) organised an Aerospace and Defence Manufacturing Summit ADMS 2014 in Bangalore. Dr.K.Tamilmani, Director General

(AERO) DRDO, inaugurated the event. Dr.C.G.Krishnadas Nair, President SIATI, presided over the function. Mr. Stephane Lauret, CEO, SAFRAN India Pvt Ltd, Dr. Mike Hennell, Founder & Technical Director, LDRA, Mr.Sunny

Jerome, Managing Editor, Aeromag Asia, Air Cmdr.(Retd) Joseph Varkey, Secretary General, SIATI, Mr. Venkata Subramaniam, CEO, System Aids also spoke on the occasion. The two day event was attended

Naresh Chandra Sharma, GM-Aero-Production, Tata Advanced Materials, Mr. Shinto Joseph, Operations Director, LDRA, Mr. Vineet Dravid, Managing Director, COMSOL, Mr. Kumara Giri, Regional Manager, FARO, Mr. B.Krishnan, Senior Business consultant – Aerospace Industry, Dassault Systemes India, Mr.D.UmaMaheshwar, Leader- Aviation Advanced Technology Organization, GE Aviation, Mr. S M Vaidya, Exec Vice President & Business Head, Godrej, Commander.Rajkumar G Tripathi, Senior Manager(Design & Development), Naval Aircraft Yard (Kochi), Mr. Sanjeev Kumar, General Manager (Offset), HAL, and Mr. Ashwin V. Deshpande, DDM Sales Manager - South Asia, Stratasys Ltd.

vendor. The day when vendor become the partner, then only the synergy will happen, then we can maximise the output".

"We are already producing helicopters, ALH and its variants. We need to supply so many to international market, our own market, coast guard, we are unable to produce the number we really require".

Mr. Muralimohan of BDL said the company started with manufacturing first generation anti-tank missile but is now producing multiuser defence products to Indian Armed forces

BDL manufactured torpedo which can be launched from ships and helicopters.

"We have some development projects and naval projects", he said.

Dr. Koshy of VSSC elaborated on how ISRO is supporting the industries. In the last ten years, ISRO has done tremendous work with Indian industry

Mr. B. Krishnan of Dassault Systems talked about virtual rollout of aerospace and defence industry and how it can be implemented in India.

Mr. Uma maheshwar of GE aviation said: "Whatever we made in last 50 years we have to replicate it in future, that is the huge challenge".

Mr. S M Vaidya of Godrej said "We are having a challenge of more than 70% of our inventories coming from abroad".

by delegates from private industries, Defence PSUs, and DRDO labs. There was a product exhibition also along with the summit. The panel discussion on offset opportunities was chaired by Dr.Krishnadas Nair.

Those who made presentations included Dr. Hennell, Mr. Stephane Lauret, CEO, SAFRAN India Pvt Ltd., Mr. Anup Vittal, MD, Safran Engg Services India, Mr.Maltesh, Head of Advanced Manufacturing at Wipro Infrastructure, Mr. S.Murali Mohan, Addl. G.M., BDL, Dr. Koshy M George, Dy Director, VSSC,

Delegates from 200 organisations participated. Dr. Tamilmani said Indian aeronautics has come of age. Indian industry, R&D and private industries have matured enough.

"Today, we have world class products like ALH", he said. "Our helicopters are flying around the globe now".

The international community clearly understands that now India has the capability to build an aircraft, a four plus generation military technology product.

"Only thing that we have to do is handholding of the private industry. Today, private industry is called a



Dr.C.G.Krishnadas Nair, President SIATI presenting memento to Mr. Stephane Lauret, CEO, SAFRAN India Pvt Ltd and, Dr. Mike Hennell, Founder & Technical Director, LDRA during ADMS 2014.



Dr.C.G.Krishnadas Nair, President SIATI presenting memento to Mr.P.Jayapal, new Chiefutive, CEMILAC, DRDO and Dr.K.Tamilmani, Director General (AERO) DRDO during ADMS 2014.



Mr. Naresh Chandra Sharma



Mr. Kumara Giri



Mr. Shinto Joseph



Air Cmdr.(Retd) Joseph Varkey



Mr. Sunny Jerome



Mr. Sanjeev Kumar



Dr. K. Tamilmani



Mr. S M Vaidya



Commander Rajkumar G Tripathi



Dr. C.G. Krishnadas Nair



Mr. Ashwin V. Deshpande



Mr. B. Krishnan



Mr. Anup Vittal



Mr. D. Uma Maheshwar



Mr. Stephane Lauret



Dr. Mike Hennell



Mr. Maltesh



Dr. Koshy M George



Mr. S. Murali Mohan



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Panel discussion during ADMS



CAE using COMSOL Multiphysics

Shrinking product life cycle and increased pressure on lower cost and improved quality, is moving the focus to smart-to-market products. Globally, organizations recognize the increasing importance of research before the Conceptualization and Design stage in Product Development. Virtual simulation and product modelling is replacing the labour-intensive manual method. Researchers want to predict earlier in the life cycle the effects of various physics on the products and its components, instead of testing this on the prototype. Scientist and researchers have found multiphysics software like COMSOL useful during the early product development stage, as it helps predict performance in real life conditions, lengthen product life, increase material optimization etc. which helps reduce need for prototyping and subsequent costs.

There are several successful products which are representational of the possibilities of innovation and technology through a Multiphysics approach to product development. An instance of multiphysics modelling would be an improved design for a stealth antenna. The best way to avoid detection by a radar system is to make sure it never receives a reflected radio frequency (RF) signal. The surface of a stealth aircraft is designed to either absorb RF radiation

or to reflect it so that it cannot reach the source. The antennas in an aircraft, however, cannot be concealed using these particular surface technologies since that would prevent their use for communication purposes. Instead, using COMSOL Multiphysics an investigation was conducted for a frequency selective surface (FSS) that will enable the antennas to perform normally at radio frequencies for communications, while absorbing all other RF frequencies. An FSS is essentially a bandpass filter that can dramatically reduce the radar cross section (RCS) to create a stealth antenna.

While traditionally researchers dealt with each physics in isolation, competition and the need for efficiency has forced product development to have an integrated approach to physics. Physical phenomena like heat transfer, stress, chemical reaction, etc. need to be coupled simultaneously to achieve a robust and well-accepted product. Also, software which allows smooth movement across different software platforms is much preferred. A stable, accurate, interoperable software with real world simulation capability, like COMSOL, is an ideal choice for scientist and researchers for breakthrough and innovative product development.

Dr. Vineet Dravid,
MD, COMSOL India



LDRA Academic Alliance Program – An Answer to Aerospace Certification Skill Shortage

A shortage of skill-based employees is hindering the growth of the Indian aerospace industry and has been for some significant time. Recent studies have highlighted that students emerging from Indian academic establishments often lack the relevant skills demanded by the modern aerospace industry and therefore have to undertake further, extensive, training in order to satisfy basic industry requirements. A significant reason for this skill-gap is the absence of collaboration between policy makers, industry and academia. There is an urgent need for superior training and infrastructure development within the education sector to create and support the significant number of emerging employment opportunities in the aerospace domain.

LDRA, the leading provider of safety-critical software verification and compliance management tools for the past 40 years, has proposed a unique offering for the Indian safety-critical embedded software market, to address the skill shortage in this domain. The

LDRA Academic Alliance Program (LAAP) aims to cater for the growing demand for embedded software experts in the aerospace, defence, automotive, industrial and medical markets.

The LDRA Academic Alliance Program (LAAP) is focussed on developing certification skills by providing high-quality training to academics and augmenting this training with the provision of LDRA academic licenses, which will then help them to incorporate best global practices into their curriculum.

The LDRA Academic Alliance Program (LAAP) offers workshops that will be conducted by LDRA application experts, providing in-depth knowledge of practical and theoretical aspects of various industry specific safety standards such as DO-178B/C for aerospace, ISO 26262 and MISRA C/C++ for automotive and IEC 62304 for medical, etc.

With this initiative, together with industry partners, LDRA aims to deliver a programme of specialised training with a focus on international safety standards and testing methodologies using LDRA tools.

Admiral RK Dhowan appointed the new CNS



Admiral RK Dhowan PVSM AVSM YSM ADC has taken over as the Chief of the Naval Staff, Indian Navy. Admiral Dhowan was commissioned in the Navy on 01 Jan 1975. He is a Navigation and Direction specialist who has served with distinction in an array of Command, Staff and Instructional appointments through his exemplary career spanning 40 years. He is an alumnus of the National Defence Academy, Defence Services Staff College and Naval War College, Newport, Rhode Island, USA.

He has commanded frontline warships INS Khukri, INS Ranjit, INS Delhi and served as Chief Staff Officer (Operations)

Headquarters Western Naval Command. He has also served as Indian Naval Adviser at the High Commission of India, London. He has commanded the Eastern Fleet as Flag Officer Commanding Eastern Fleet and served as Chief of Staff at Headquarters Eastern Naval Command, Visakhapatnam. He also has the distinction of commanding the prestigious 'National Defence Academy', his alma mater as the Commandant.

The important staff appointments held by the Admiral at Naval Headquarters are Assistant Chief of the Naval Staff (Policy and plans), Deputy Chief of Naval Staff and Vice Chief of Naval Staff.

Ambassador of France holds reception for MBDA-ISAE scholarship students

The first group of Indian students to be awarded scholarships under the MBDA Programme of Excellence, were invited to a reception hosted by the Ambassador of France to India, Mr François Richier, at his Residence in New Delhi.

Thanks to this scholarship, in September 2014, seven Indian students will be embarking on a two-year Master's programme at the prestigious French university Institut Supérieur de l'Aéronautique et de l'Espace (ISAE) situated in Toulouse, southern France. On successfully completing their studies, the students will be awarded an internationally recognised MSc in Aerospace, Mechanics and Avionics.

During the reception the Ambassador said: "All engineers contribute to their nation's technological and industrial progress. The bright young Indian students who have been chosen by MBDA and ISAE will do even more. They will play their part in preparing the future of the relationship of France and India" The seven students - five men and two women, aged between 21 and 25 and graduates from various Indian institutions of higher education - were selected by an admissions panel constituted and administered independently by the ISAE. They will be studying with students from various other countries around the world in a truly international environment. In 2015 and 2016, two more batches of eight students will be selected for the MBDA scholarship programme.

Chinese delegation visits India



Lieutenant General Qi Jianguo, Deputy Chief of General Staff (Operations), PLA China along with an eight member delegation visited India.

The two sides exchanged views on various issues of mutual interest such as maintenance of peace and tranquility along Line of Actual Control and enhancing mutual cooperation and understanding between the armies of India and China. Measures for implementation of existing Bilateral Agreements were also discussed.

The meeting was held in a warm and cordial atmosphere. Both sides agreed on the need to enhance bilateral military engagements. The Chinese side has confirmed their participation in the

Fourth India China Joint Training Exercise scheduled to be held in November 2014 in India. The PLA Delegation also called on the Chairman Chiefs of Staff Committee and the Chief of Army Staff, General Bikram Singh and the Defence Secretary. India and China attach great importance to high level military exchanges. 2014 has also been declared as "Year of Friendly Exchanges". It may be recalled that in February this year, the PLA Delegation led by Lieutenant General Wang Guanzhong, Deputy Chief of General Staff had come to India for Annual Def Dialogue and the Indian Defence Minister Mr.A.K.Antony had visited China in July 2013. The Chinese side have also confirmed the visit of their Defence Minister General Chang Wanquan to India later this year.

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FIA 2014 welcomes F-35

In response to the announcement that the F-35 Lighting II aircraft will be flying at the Farnborough International Airshow, Amanda Stainer, Commercial Director for show organisers Farnborough International Ltd said, 'We are delighted that the news has now been confirmed after weeks of speculation. We are incredibly pleased that the UK MoD and the US DoD have chosen the event to showcase the aircraft.'

"The JSF and F-35 programme has seen participation from nine partner countries including the United Kingdom. FIA will provide the perfect venue for many of the global supply chain companies involved in the programme to showcase their expertise".

FIL Chief Executive, Shaun Ormrod also commented, "The F-35 Lighting II is one of the most advanced aircraft to be developed for a very long time and will create a great deal of interest at the

show."

The F-35 Lighting II's presence at FIA 14 also mark's a unique aviation first with the aircraft's VTOL (Vertical Take Off and Landing) predecessor, the Sea Harrier, also being present at the show. Speaking about the occasion, Shaun Ormrod said, "The Harrier has played a distinct role in modern aviation history, a hero of the Falklands War and a superb example of aviation technology. The opportunity to see the last and next generation of vertical thrust aircraft at the same venue marks a milestone in aviation history."

Defence Secretary, Sir Philip Hammond announced that the F-35 Lighting II will make its international debut in the UK at the FIA 2014 and RIAT. The decision to fly the combat aircraft outside of the United States for the first time, following discussions between Philip Hammond and his US counterpart, Secretary Hagel, is a further demonstration of

the progress with the Lightning II programme.

The selection of two UK airshows also demonstrates the significant role that Britain has in the programme. Approximately 15 per cent of every aircraft is built in the UK.

Defence Secretary Philip Hammond said, "The US and the UK have worked closely together on the F-35 project from the beginning. We are the only country that is a first tier partner in the project, which is sustaining tens of thousands of jobs in the UK."

This fifth generation stealth combat aircraft will be a major boost to British combat air power and it is entirely fitting that the F-35's first stop outside the United States will be in the UK."

The F-35 will be making demonstration flights at both trade show and the public weekend. The Sea Harrier comes to show from the Spanish Navy.



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Eaton awarded Channel Champion 2014 by CRN

Power Management Company Eaton has been awarded Channel Champion 2014 by CRN during a special awards ceremony at the XChange Solution Provider Conference in Los Angeles, California. Eaton is the overall winner in the category of Power Protection and Management, also winning awards in Financial Satisfaction and Support Satisfaction sub-categories.

Ramesh Menon, director, global channel marketing, and Curtiz Gangi, director, U.S. Channels, Data Center Sales Segment, were felicitated as 2014 Channel Chiefs by CRN for their leadership in creating an effective channel program for information technology solution providers. This is the third year in a row that Menon has been recognized on CRN's list of esteemed IT channel leaders.

The awards resonate Eaton's continued growth and unparalleled commitment to information technology

channel programs and channel partners. The 2014 Channel Chiefs were selected by the CRN editorial team based on channel experience, program innovations, channel-driven revenue and public support for the importance of IT channel sales.

"Such recognitions encourage us to continue efforts to support our channel



partners, and enable them to grow a huge network aligned to the company's roadmap. Introducing innovative technologies attract forward thinking value added resellers in India, and we are

confident that the technical superiority of our products, coupled with emphatic support from our partners is the way to move forward," said Syed Sajjhadh Ali, Managing Director, Eaton Electrical, India.

Eaton continues to introduce innovative technology and programs to attract channel partners. Launched in 2011 in India, Eaton's PowerAdvantage™ Partner Program continues to provide resellers with the tools to deliver greater business value to customers and maximize revenues within the key growth segments of power and energy efficiency. This program was expanded to help Indian resellers grow their businesses through power backup and management solutions. Additionally, the Eaton Power Quality team continues to provide innovative and integrated solutions to help customers maximize the business value of their IT infrastructures.

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Boeing Forecasts Demand in India for 1,600 New Airplanes Worth \$205 Billion

Fleet expected to grow more than five times in size over next 20 years
Boeing projects demand for more than 1,600 new airplanes in India over the next 20 years, valued at \$205 billion. The company briefed its 20-year market outlook for the country at India Aviation 2014, forecasting India's commercial aviation fleet will grow more than five times in size.



"India's demographics are highly favorable to the growth of air transportation," said Dinesh Keskar, senior vice president of Sales, Asia Pacific and India, Boeing Commercial Airplanes. "The share of India's large population entering the workforce is growing. India could have the world's fourth-largest economy if current trends continue helping drive demand for air travel."

Boeing projects that passenger airlines in India will rely primarily on single-aisle airplanes such as the Next-Generation 737 and the 737 MAX, a new-engine variant of the market-leading 737, to connect passengers. Single-aisle airplanes will represent 83 percent of the new airplanes in the country.

For long-haul traffic, Boeing forecasts twin-aisle airplanes such as the 747-8 Intercontinental, 777 and the 787 Dreamliner will account for 15 percent of new airplane deliveries. Boeing's recently launched 787-10 and 777X also will support the demand

for fuel-efficient twin-aisle airplanes in India.

The 20-year forecast of airplane deliveries by airplane types is as follows:

India New Airplane Deliveries: 2013-2032

Airplane Type	Deliveries	Value (US\$)
Single-aisle	1,330	\$132 billion
Twin-aisle	235	\$72 billion
Regional jets	35	\$1 billion

"India will continue to have one of the strongest, most vibrant aviation markets in the world over the next two decades," said Keskar. "While passenger growth is recovering and we project a healthy aviation industry in the long term, adverse near-term trends of overcapacity, a weak rupee and high fuel prices will affect airline profitability in the near term."

HAL crosses Rs. 15,000 crore milestone

HAL has notched-up the highest ever turnover of Rs. 15,180 crores for the FY 2013-14 surpassing the previous year's figure of Rs. 14,324 crores. "We crossed the psychological barrier of Rs. 15,000 crores and the production has been pretty good as we produced 60 aircraft and helicopters, achieved the initial operational clearance (II) of LCA and filed record 209 patents during the year", said Dr. R.K. Tyagi, Chairman, HAL. "We are preparing the company for 2020 and beyond", he added.

HAL's Value of Production (VOP) for FY 2013-14, stood at Rs. 15,296 crores as against the figure of Rs. 14,202 crores of the previous year. The operating profit went up to Rs. 1,651 crores in the FY 2013-14 as against Rs. 1,194 crores in 2012-13.

In the meantime, HAL received the "Most Efficient Navratna 2013" award at the fifth Dalal Street Investment Journal Awards night held in New Delhi yesterday. HAL Chairman, Dr. R.K. Tyagi received the award from the jury. The awards were presented to the

various PSUs in different categories in recognition of their performance and contribution to the Indian economy.

Some of the HAL highlights for the FY 2013-14 included Initial Operational Clearance (IOC) received for Light Combat Aircraft (LCA), sea level, night level and high altitude trials successfully done for IJT, induction of first completely Indian manufactured Hawk Advanced Jet Trainer by INS Dega, Visakhapatnam, dedication of ALH-Dhruv, Garuda Vasudha to the nation for exploration of mineral wealth, contribution of structures for Mars Orbiter Mission (MOM) and Crew Module structure assembly for the Human Spaceflight Programme (HSP) to ISRO.

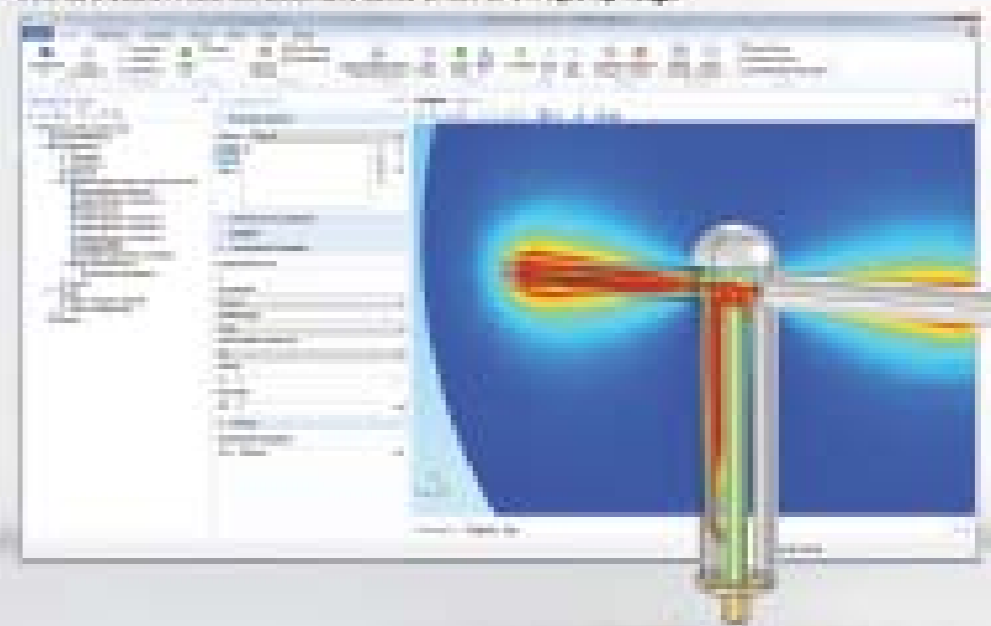
Besides the prudent financial management, the company took several initiatives on R&D front, indigenisation, quality, customer support, IT, HR and CSR. HAL played a vital role during the Uttarakhand flood relief operation during July 2013 as its ALH-Dhruv performed effectively in a massive rescue and relief operation, clocking more than 600 hrs of flying.

NI introduces next-generation wireless prototyping platform

National Instruments announced an integrated software defined radio solution for rapidly prototyping high-performance, multichannel wireless communication systems. The NI USRP RIO platform is built on the NI LabVIEW RIO architecture and combines a high-performance 2 x 2 multiple input, multiple output (MIMO) RF transceiver capable of transmitting and receiving signals from 50 MHz to 6 GHz with an open LabVIEW programmable FPGA architecture.

Wireless engineers can use this technology to rapidly prototype real-time wireless communications systems and test them under real-world conditions. They can also prototype more capable wireless algorithms and systems faster and reduce time to results using the only complete platform to take full advantage of a graphical system design approach.

COMSOL MULTIPHYSICS Model of a superconducting cable with a central conductor, superconductor, and insulation. The model is used to analyze the magnetic field and temperature distribution in the cable during operation.



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Power Electronics	Heat Transfer	Computational Fluid Dynamics	Structural Mechanics (Nonlinear)
Power Systems	Thermal-Fluid Coupling	Computational Solid Mechanics	Structural Mechanics (Fatigue)
Power Distribution	Thermal-Structural Coupling	Computational Fluid-Structure Interaction	Structural Mechanics (Stress Analysis)
Power Quality	Thermal-Electromagnetic Coupling	Computational Fluid-Structure Interaction	Structural Mechanics (Vibration)
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Russian Helicopters changing the face of helicopter industry

Russian Helicopters, a subsidiary of Oboronprom, part of State Corporation Rostec, discussed a broad range of issues to do with restructuring and upgrading its production capacities and streamlining its management processes at a meeting of the company's Collegium. The Collegium – held at Kazan Helicopters, a Russian Helicopters company – also discussed the production efficiency of Russia's helicopter-construction sector today and its future development.

CEO Alexander Mikheev was joined at the Collegium by officials from the Russian Helicopters parent company and its production and R&D assets. "Russia's helicopter-building industry is changing fast," said Alexander Mikheev. "We have set ourselves ambitious targets and are building a dynamic and efficient company to achieve them. To attain 20% global market share we still have much to do – completing the restructuring and upgrades of our production capacities, continuing to expand our model range, growing our technological capabilities, increasing our intellectual and production potential, and rolling out our global after-sales care system, which will include some of the company's maintenance facilities."

The Collegium noted the substantial progress made on the company's core projects in 2013. More than 800 new pieces of equipment were installed at Russian Helicopters facilities to improve production safety and reduce the company's environmental footprint. Significant successes were achieved by the company's investment projects, including completion of the technological development of machining, plating and composite production.

Last year the company invested RUB 8.3 billion in upgrades to production capabilities, up 8.5% year on year. Labour efficiency also increased significantly, with output per employee rising by 12.4% to RUB 3.4 million. The company boosted spending on R&D activities by 48.4% to RUB 7.9 billion. Russian Helicopters continues to pursue a strategy of growing its innovation potential.

These measures have helped the company to grow its financial and operational results in recent years. In 2013 Russian Helicopters recorded a 10% increase in revenue to RUB 138.3 billion, with deliveries reaching 275

helicopters. The firm order book at year-end stood at 808 helicopters, with a list value of RUB 401.2 billion. Deliveries for 2014 are 100% covered by firm orders. The Collegium also discussed the company's core priorities for 2014. Issues discussed included the streamlining of management processes and interaction among group companies to improve decision-making and reduce costs.

Among measures to optimise and upgrade production efficiency, the Collegium noted ongoing work to expand collaboration with SMEs able to produce and supply high-quality parts and components.

Another area of great potential is the creation of design bureaux at helicopter construction plants to help maximise the efficiency of interaction between production facilities and the Mil and Kamov design bureaux. Successful examples can be found today at Rostvertol, Ulan-Ude Aviation Plant and Progress Arsenyev Aviation Company.

Russian Helicopters continues to devote considerable resources to improving quality. Today the company's quality management system is being improved to meet international standards for the aerospace and defence sectors. Last year the company joined the European Aerospace Quality Group (EAQG), and work in this area will continue in 2014 at the international level.

SL Engineering makes acquisition

The aerospace tubular parts manufacturer SL Engineering is continuing its investment in advanced automation with the acquisition of a second all-electric CNC tube bending machine from Unison.

The new machine enhances SL Engineering's manufacturing capabilities, especially its ability to produce more complex tubular shapes. It also extends the size range of tubing that can be bent using all-electric servomotor-controlled movement - to tube and pipe diameters up to 80 mm.

"Engine and aircraft manufacturers are taking advantage of the advanced shape forming capability of state-of-the-art tube bending machines by specifying more complex shapes and highly challenging tighter-radius bends - to save weight and space and eliminate welded joints," says Shaun Stevenson of SL Engineering. "The sophisticated bending capability of Unison machines, which allow greater control over

tube clamp and carriage push forces, helps us to achieve these new levels of precision. If we did the same jobs on our old hydraulic machines we would be much more reliant on highly skilled operators to both set up the machines, and make the parts with additional weld joints, and hence additional cost."

SL Engineering (SLE) is one of Europe's leading Tier 1 suppliers of rigid tube assemblies and precision machined parts for aerospace applications, and supplies components to major engine and airframe programs from commercial Airbus and Boeing aircraft to leading military programs such as the Joint Strike Fighter (JSF). Although the aerospace sector accounts for a large proportion of turnover, SLE also provides parts for industrial gas turbines, marine propulsion, and other critical industry applications.

SLE's business today is characterised by a need for manufacturing flexibility. The average batch is around 5 to 25 parts, and orders can even be for just a single emergency 'aircraft-on-ground' part. Demand for greater precision and shape complexity is another major facet of its work. Until recently, few tubular parts required bends with radii of less than 2D (twice the tube diameter). Today, however SLE regularly receives requests for bends of 1D, and for shapes with minimal straight sections between bends. The use of thinner walled tubing, and expensive specialist materials such as titanium and Inconel are further trends.

These demands are behind the company's moves to all-electric tube bending technology. SLE installed its first such bending machine in 2010 - a 30 mm diameter Breeze from the UK manufacturer Unison. Much of SLE's work is on diameters of 30 mm or less, and most of its current work falls into the sub-50.8 mm range. The first all-electric machine has proved critical for SLE, allowing it to handle small batch set-ups much more efficiently and quickly - with zero or minimal scrap. As a result, the company channels most new work for smaller parts onto the 30mm all-electric machine, and transfers many older parts onto the machine by creating new bending programs as orders come in. After almost four years of operation, the 30 mm machine now produces a significant proportion of SLE's business. SLE typically has anywhere from 500 to 1000 live jobs at any one time.



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Jayapal is new Chief Executive of CEMILAC

Mr. P Jayapal has been appointed as the new Chief Executive of Center for Military Airworthiness and Certification (CEMILAC), an organization of DRDO, Ministry of Defence, Bangalore. He assumed charge from Dr. K Tamil Mani, Distinguished Scientist and Director General (Aeronautics) who was holding the additional charge as CE, CEMILAC subsequent to his elevation as DG (Aeronautics).

Mr. Jayapal is an alumnus of MIT, Anna University from where he obtained his B.Tech degree in Aeronautical Engineering (1983) and his Masters. He joined Defence Research and Development Organization (DRDO), in 1985 in Regional Centre for Military Airworthiness, RCMA, (Nasik). In 1990, he joined RCMA(Helicopters), Bangalore and later took over as Regional Director, RCMA(Helicopters) in the year 2005. He was elevated to the position of Group Director (Aircraft) in CEMILAC, Bangalore.

As Chief Executive (Airworthiness) he is overseeing the Airworthiness Clearance Certification activities on abinitio projects like LCA, ALH, HJT-36, UAVs and several major upgrade programmes of the Defence Services. As the head of the organization, he is responsible for monitoring all Airworthiness activities of 14 RCMA's situated all over India and assuring flight safety of all Military Airborne Vehicles / Stores of the nation.

He is the recipient of Lab Level Technology Group Award 2007 and DRDO AGNI Award for Excellence in Self-Reliance for the year 2001 and 2008.



Eurofighter Typhoon - 20 years strong

Europe's biggest defence programme marks a 20 year anniversary as it celebrates the first flight of the Eurofighter Typhoon on 27th March 1994.

Since that day in Manching, Germany, when Development Aircraft 1 (DA1) was flown by Test Pilot Peter Weger, over 400 Eurofighter Typhoons have been delivered with six international customers operating the aircraft and a seventh signed up.

The milestone was marked this week at Eurofighter's main European offices close to Munich where Test Pilots from all the four nations that make up the Eurofighter programme came together to re-live the maiden flights made in Germany, the UK, Italy and Spain. They were joined by the General Manager of NETMA, Air Vice-Marshal Graham Farnell, the Chief Executive Officer of Eurofighter, Alberto Gutierrez, Board Members of both organisations and Eurofighter employees.

Alberto Gutierrez, said: "This is an historic day for the European defence industry. We have built up a fantastic legacy in this aircraft and established the foundation of today's defence industry in Europe through unprecedented co-operation and a determined focus to build and deliver a world-class product.

"Twenty years ago, none of us could know how the world would change

and few, if any of us, could have anticipated the challenges that this would bring. Now more than ever it is vital that we maintain and develop our European capabilities both in the commercial and military domains. It is in all our interests to do this."

The Spanish-born CEO added: "The Eurofighter Typhoon that Peter Weger first flew 20 years ago is very different to the one that flies today. From the outset, the aircraft was built with capability enhancement in mind and the process of enhancement is what delivers a long-term return on investment. The Eurofighter is now the backbone of a number of air forces and will be in service for decades to come. It is a significant European asset and one which showcases to the world the very best in technology and innovation."

NETMA's General Manager, Graham Farnell said: "The dream of our predecessors, some 30 years ago, of a world-class European Fighter Aircraft, became a reality on 27th March 1994. This success could not have been reached without a huge amount of hard work and dedication from so many people in so many organisations across Europe."

"The aircraft they built is now fully operational in the air forces of Germany, Spain, Italy, the United Kingdom and with our partners in

Austria and the Kingdom of Saudi Arabia. Soon it will also be delivered to Oman. It is defending skies and providing a 24/7 watch over Europe, the Middle East – and around the Antarctic region. The challenges we

face today are no less demanding than those which our predecessors had when they set out to develop this aircraft. We now need to show the same resolve, determination and vision that they had."

While it was DA1 that first flew in Germany in 1994, it was the British who next took to the air with DA2 a few days later on 6th April. Italy followed in June 1995 and Spain in August 1996. Today, Eurofighter Typhoon aircraft are built at Final Assembly Plants in all four countries.

In total more than 225,000 flying hours have been accumulated with unprecedented levels of reliability. The aircraft has also seen active service in Libya, has been used on Baltic patrol exercises and has recently been showcased at one of the world's leading air-to-air combat training events, Red Flag, at Nellis Air Force Base in Nevada.

Peter Weger, who flew that first flight said: "I had little idea when I made that maiden flight from Manching what an amazing story this would become. I knew I was piloting an incredible aircraft and we had something special. It is certainly one of those days that lives with you for the rest of your life."



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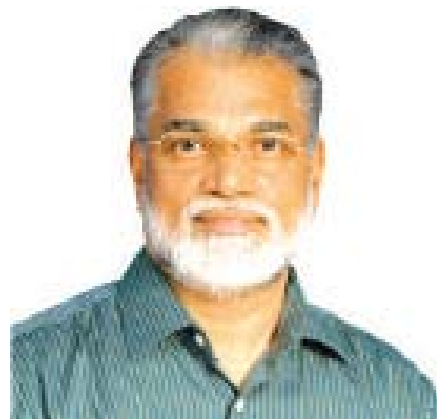
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ISRO going from strength to strength



Dr. K. Radhakrishnan
Chairman, ISRO



Indian Space Research Organisation's Polar Satellite Launch Vehicle, PSLV-C24, recently successfully launched IRNSS-1B, the second satellite in the Indian Regional Navigation Satellite System (IRNSS), from Satish Dhawan Space Centre SHAR, Sriharikota. This is the twenty fifth consecutively successful mission of PSLV. The 'XL' configuration of PSLV was used for this mission. Previously, the same configuration of the vehicle was used five times to launch Chandrayaan-1, GSAT-12, RISAT-1, IRNSS-1A and Mars Orbiter Spacecraft.

After the lift-off with the ignition of the first stage, the important flight events, namely, stage and strap-on ignitions, heat-shield separation, stage and strap-on separations and satellite injection took place exactly as planned. After a flight of about 19 minutes, IRNSS-1B Satellite, weighing 1432 kg, was injected to an elliptical orbit of 283 km X 20,630 km, which is very close to the intended orbit.

After injection, the solar panels of IRNSS-1B were deployed automatically. ISRO's Master Control Facility (at Hassan, Karnataka) assumed the control of the satellite. Five orbit manoeuvres were conducted from Master Control Facility to position the satellite in its Geosynchronous Circular Orbit at 55 deg East longitude.

IRNSS-1B is the second of the seven satellites constituting the space segment of the Indian Regional Navigation Satellite System. IRNSS-1A, the first satellite of the constellation, is functioning satisfactorily from its designated geosynchronous

orbital position.

IRNSS is an independent regional navigation satellite system designed to provide position information in the Indian region and 1500 km around the Indian mainland. IRNSS would provide two types of services, namely, Standard Positioning Services (SPS) - provided to all users - and Restricted Services (RS), provided only to authorised users.

A number of ground stations responsible for the generation and transmission of navigation parameters, satellite control, satellite ranging and monitoring, etc., have been established in as many as 15 locations across the country.

Two more satellites of this constellation, namely, IRNSS-1C and IRNSS-1D, are planned to be launched in the second half of 2014. The entire IRNSS constellation of seven satellites is planned to be completed by 2015-16.

It's also worth mentioning here that India's Mars Orbiter Spacecraft recently crossed the half-way mark of its journey to the Red Planet along the designated helio-centric trajectory.

Mars Orbiter Spacecraft was launched onboard PSLV-C25 on November 05, 2013. On December 01, 2013, Trans Mars Injection manoeuvre was conducted successfully and the Spacecraft was set in its course towards Planet Mars through a helio-centric trajectory. Soon after the Spacecraft crossed the sphere of

influence of Earth, a Trajectory Correction Manoeuvre (TCM) was performed successfully on December 11, 2013.

ISRO has been continuously monitoring the Spacecraft using its Deep Space Network complemented by that of NASA-JPL. As the Spacecraft is on its designated trajectory, the TCM planned for April 2014 is not considered essential. If required, the next TCM is planned to be carried out in June 2014.

Mars Orbiter Spacecraft and its five scientific instruments are in good health. Periodic tests are being done on the different levels of autonomy built into the Spacecraft for managing contingencies.

At present, the radio distance between the Spacecraft and the Earth is 39 million km. A signal from the Earth to the Spacecraft and back to Earth takes 4 minutes and 15 seconds. Soon, the High Gain Antenna of the Spacecraft will be put in service for handling communications with the ground stations.

The Mars Orbit Insertion (MOI) manoeuvre would be performed on September 24, 2014.

The Indigenous Cryogenic Upper Stage was successfully flight-tested by ISRO recently onboard GSLV-D5 launch vehicle from Satish Dhawan Space Centre SHAR, Sriharikota. In this successful flight of GSLV-D5, a communication satellite - GSAT-14 - was launched very precisely to its intended Geosynchronous Transfer Orbit.

Aerospace Engineers unveils business expansion drive



Mr. R. Sunder
CEO,
Aerospace Engineers

Aerospace Engineers is a key developer of critical, high precision aircraft components and global supplier in aerospace and defense. Accredited with the prestigious AS 9100C, its intricate and ultra precise technical testing devices corroborated with systematic documentation have earned it the approval of Defense Research & Development Organization. With steady growth and diversification, Aerospace Engineers today commands a significant presence in the manufacturing of precision parts. Now totally powered by SAP by design implementation, Aerospace Engineers has manufactured about 15,000 parts that comply with global aviation requirements with rigorous quality standards ratified by authorities.

Aerospace Engineers' Precision Parts Division (PPD) is a vibrant manufacturing Group having qualified engineers with adequate experience and in-depth knowledge.

The PPD is well equipped in the areas of R & D, design, manufactures, repairs, distributes and overhaul of Metallic & LRU parts that extend over the entire helicopter & aircraft, from the engines

all the way to hydraulic, pneumatic, structures and even interiors. Highly skilled teams at Aerospace Engineers have consistently delivered exemplary solutions to various customers over the years, helping them in no small measure to move up the industrial ladder. It also developed a string of composite items for BrahMos and various missile parts for Agni, Akash and Prithvi.

The company has also established ties with OEMs such as HAL, Boeing, Airbus, Sikorsky, Meggitt, Goodrich, TATA Advanced Systems, Honeywell, Snecma, Heico, Tyco Electronics, Eaton and Moog Aerospace, offering them advanced competent technological solutions and also supplying metallic and non metallic products to ADE, ADA, HAL, BrahMos, ASL, CABS, DRDL, DARE, RCI, DEBEL, VRDE, GTRE, etc. The company has tied up with Wesco Aircraft on supplies of bulk orders.

Aerospace Engineers offers design, development, manufacturing, assembly, supply and integration of systems and implementation of projects. To tap opportunities overseas, Aerospace Engineers has spread its wings to Dallas,

the USA. The company has participated in the NADCAP training program, and it has also established a NABL accredited Laboratory in the new plant launched recently. The company has also secured "Design Approval by Center for Military Airworthiness, Ministry of defense, Government of India." (CEMILAC)

Aerospace Engineers recently forayed into the development of Main Gear Box Lubrication Oil Pump for Helicopter, Dual pump for GTRE Un manned aircraft, Fuel Pump with Brushless motor for Light Compact Aircraft, Pump for Lycoming Engine which has secured ratification from Air Worthiness Authorities and an Award for Excellence in Aerospace Indigenization from SIATI. It has also developed Aerospace metallic hoses for Hydraulic & Pneumatic applications, Fittings, Connectors and Aeronautical precision parts. And now the company's goal is to manufacture Elastomeric Bearing, Fuel Pump, Fuel Dump Valve, SOC and TV plunger and Fuel Shut off Valve, among other things.

Aerospace Engineers is also in the process of promoting its new project, "SABB Aerospace components Private Limited" for manufacturing of composite parts for missiles.



MiG-29 fighter: from stagnation towards prosperity

Export perspectives of the famous fighter family

By Dr. Konstantin Makienko,

Deputy Director of Centre for Analysis of Strategies and Technologies (CAST), the leading Russian non-state think-tank on security affairs.

It is not a mere exaggeration to state that "MiG" is the most famous trade mark in combat aviation worldwide. During 73 years of its history, the MiG Corporation has set up a number of records, not to be repeated in years to come, precisely:

- above 60 000 of manufactured aircraft;
- 17 500 MiG-15 jet-propelled fighters;
- 11 000 MiG-21 super-sonic a/c.

The first half-century of the MiG's history had been a period of constant growth. It was followed by a serious decline. For the last decade the downturn had been replaced by the steady development.

The main impulse of this positive trend has come up as spin-offs in development of basic features implemented in the MiG-29 fighter. Together with Su-27/Su-30, F-15 and F-16 fighters, MiG-29 belongs to a small family of aircraft, whose potential for up-gradation happened to be much wider, that their designer could had initially imagined.

MiG-29 had been designed as the Soviet response to the US challenge in development of the 4th generation fighter. It was projected as a light combat aircraft – a competitor and a contender of the American F-16. But to some extent, MiG-29 was more resembling F-15, being light-weight and aerodynamically more advanced, in comparison with F-16, initially designed only for a dog fighting mission.

Actually, MiG-29, being fitted with middle- and short-range missiles, multi-channel detection system and helmet target designation system, has set up a sort of internationally accepted standard of 4th generation fighter. Successful implementation of programs like 'Eurofighter Typhoon' and 'Dasso Rafale' speaks in favor of this thesis.

By now a total number of all types of MiG-29s exceed 1600, what is the second position worldwide among aircraft of 4th generation. By the end of 80th of the last century MiG-29 had formed up the backbone of fighters' stable of the Russian AF and it had been highly popular in the world.

But by the early 1990s in view of the economic slowdown in Russia, the Russian military stopped their acquisition programs, MiG-29 including. Expectations on big-scale exports happened to be bleak as well. And the Corporation entered a period of uncertainty.

And some positive changes were initiated only in 1999 with the support of the Russian government. That time was selected and implemented rational and successful technical policy, due to which MiG29SMT multi-role fighter had been developed by 2004.

During 2000 – 2003, contracts with some countries of Africa, the Middle East and South-East Asia had been signed up. In sum, above 45 MiGs of different types (MiG-29SMT including) had been exported.

By the middle of 2000s MiG Corp had overcome the crisis phase of its

development. Its corporate structure was optimized, its financial status was improved and all prerequisites for restarting a full-scale manufacturing program were available.

But for getting the same niche on the world market required a really state-of-the-art product. And it was made available as a family of multi-functional fighters of "4++" generation with MiG-29K/KUB ship-born fighter as the basic a/c.

A concept of its development was based on following ideas: up-graded aerodynamics of MiG-29 plus new aircraft systems plus fly-by-wire plus total replacement of avionics. The aircraft has got a glass cockpit, new generation radar, and a modern multi-channel electro-optical aiming system.

In early 2000s MiG Corporation had been undertaking the new family's design and testing using only its own resources. But the efforts happened to be quite successful. In 2004 the Indian MoD signed up a contract on deliveries of 16 MiG-29K/KUB for its "Vikramaditya" aircraft carrier.

The Indian Navy started their operation in 2009 and in 2010 the second contract was signed on delivery of the second batch of MiG-29K/KUB (29 a/c). First fighters of this batch were shipped to India at the end of 2012.

Test flights of MiG-29K/KUB on the board of "Admiral Kuznetsov" a/c carrier in 2009 had made positive impressions on the commanding staff of the Russian Navy, and in the early 2012 the RN had ordered 24 fighters. **>cont'd Next page**



Chairman of DDMB Dr R.K. Tyagi with Dr K. Tamilmani, DG (Aeronautics), Dr C.P. Ramanarayanan, Director, GTRE, Dr Ajit Kalghatgi, Director (R&D, BEL), Dr Shyam Chetty, Director, NAL, Mr P Srikumar, Director, ADE and Mr. T. Suvarna Raju, Director, Design and Development of HAL.

Govt-constituted DDMB holds first meeting

The first meeting of newly constituted Design & Development Management Board (DDMB) by the Government to strengthen design and development in aerospace and promote self-reliance in the critical areas of India's defence preparedness was held at HAL Corporate Office. The Board comprises key members of India's premier defence organizations involved in research, production and manufacturing activities.

"We need to have clear road map to take on the challenges in defence sector as issues concerned range from basic and applied research, involvement of academia, production, spotting and

retaining talent", said Chairman of DDMB, Dr R.K. Tyagi who is also Chairman of HAL. Dr K. Tamilmani, DG (Aeronautics), Dr C.P. Ramanarayanan, Director, GTRE, Dr Ajit Kalghatgi, Director (R&D, BEL), Dr Shyam Chetty, Director, NAL, Mr P Srikumar, Director, ADE and Mr. T. Suvarna Raju, Director, Design and Development of HAL (who is Member Secretary of the Board) were present on the occasion.

The meeting brain-stormed on how to build a strong foundation for R&D by synergizing the core competency of all the organizations involved, creating conducive environment for research and support business academia

collaboration. The meeting also felt that all the concerned organizations must share the lessons learnt from the past programs and make combined efforts to ensure success of future programs with thrust on indigenization. Acquiring of modern technology and measures to be taken to retain quality manpower were also discussed. The forum would act as a platform for stimulating initiatives and suggest policy interventions for bringing inclusive growth. The DDMB members will deliberate at length most of these issues in their future meetings and the recommendations will be communicated to the stakeholders.

Simultaneously with supplies of MiG-29K/KUB a/c, the series production of air-based version of MiG-29M/M2 was launched. For countries, which operate MiG-29s, this aircraft provides quite an opportunity to increase the efficiency of their air forces without big expenses on new infrastructure and personnel's training. Some interest to an acquisition of precisely this fighter was demonstrated by Kazakhstan.

The MiG-35 Program keeps its further development as well. It incorporates the main advantages of MiG-29M/M2 with some features of 5th generation a/c, like AESA radar.

In general, export perspectives of fighters of the MiG-29's family may be dictated by the following factors:

- an efficiency, comparable with ones of competitors, in conjunction with easy operation and low prices for maintenance;
- a comparably low political sensitivity in issues of acquisitions of middle-weight fighters in comparison with ones of heavy-weight;
- an availability of huge park of MiG-29s in 28 countries worldwide with well-established ground infrastructures and trained personnel;
- the Russia's capacity to exercise a sort of control (due to deliveries of air engines) exports of FC-1/JH-17 и J/F-10 Chinese light and middle fighters.

Diehl Aerospace wins Crystal Cabin award

In spite of strong competition, Diehl Aerospace won recognition at the Aircraft Interiors Expo (AIX) in Hamburg for its concept "Energy Autonomous Cabin". The jury chose DACAPO (Distributed Autonomous Cabin Power) in the category "Greener Cabin, Health, Safety & Environment". Core of the concept is the energy supply in the cabin, based on a space-saving fuel cell which can be integrated in the galley.

Benno Petersen and Ronny Knepple received the coveted trophy from the hands of Peter Bishop, member of the jury as well as founder and managing director of Bishop GmbH Aeronautical Engineers. The Crystal Cabin Award is highly treasured honor in the sector of cabin interiors for passenger aircraft. The prize is presented annually in various categories during the world's largest trade fair for cabin interiors – the Aircraft Interiors Expo.

Additive Manufacturing: Creative scope to design for gripping system components

When conventional handling modules reach their limits, additive manufactured solutions made of polyamide are able to step into the gap. The robust and abrasion-resistant flight weight increases process reliability and efficiency.

Since 2005, SCHUNK has been focusing on the near limitless possibilities of additive manufactured gripping system components. The competence leader for clamping technology and gripping systems has consequently analyzed the various generative manufacturing methods on other fields of applications such as handling and assembly. In test series, SCHUNK looked at the behavior of solid joints, the dependence of production orientation (load direction), and the reset process. Moreover, SCHUNK and the Fraunhofer IPA tested generatively manufactured robot grippers and optimized them. The result was impressive: Additive manufactured gripping components are light, wear-free, and are exceptionally adaptive. They open up new creative scopes to develop standard modules and application-specific special solutions.

Complex parts are feasible

There is no doubt that the main advantage of additive manufactured components is the enormous degree of freedom with regard to the part geometry. Design engineers don't have to pay attention to draft angles, or undercuts, and can strike new paths. Channels for power, signal, or compressed air feeding can be directly integrated in the gripper. Complex components, which are manufactured in the conventional way with great efforts, can be comparably easily manufactured with the layering technique. And also moveable parts, such as hinges, can be manufactured in a single piece, and many elaborate assembly steps are not necessary. Since the components are directly generated from the CAD system, manufacturing time is reduced considerably. Particularly in case of



individual solutions manufactured in small quantities, additive manufacturing offers enormous advantages in regards to cost and time. Depending on the complexity of the application, SCHUNK can calculate within a 1 to 2 weeks lead time for engineering and manufacturing individually designed gripper fingers. Due to the low weight of polyamide modules, further effects arise: the light polyamide components offer optimum preconditions for shortening cycle times, reducing energy consumption, and for the use of smaller robots and handling systems.

Today, the modern laser-sinter plants are used for chipless and tool-free manufacturing of different modules from light and wear-free polyamide PA12. The program comprises one-piece grippers with an encapsulated actuator diaphragm for hygiene critical applications, by individually formed, flexible gripper fingers, to additively manufactured quick-change systems, which are directly integrated in the gripper or gripper fingers, and if required, they can be equipped with media feed-throughs. Even complex contours or individual markings are feasible without additional costs. Since polyamide is chemically resistant and food compatible, it can be also reliably used in conjunction with aggressive media, and in the food-processing industry.

Maximum cost transparency

The function of SCHUNK is not limited to manufacturing components. Instead, it is more about being a competent problem solver for implementing sophisticated handling solutions. SCHUNK developed additively manufactured polyamide fingers for the automotive industry, used for verification process of induction forged precision components and considerably shortened the whole verification process. Gripping modules are used in a measuring cell, and in one single process step three component features can be optically controlled without having to change the gripped position. The internal gearing, the number and shape of the teeth; the tapped hole, this means the position of the bore hole and the number of thread convolutions; and the symmetry of the lateral milled slot. For this purpose, the SCHUNK universal gripper PGN-plus is equipped with individually shaped polyamide fingers in a way that



the test position of all relevant features is visible at the same time. The reflection-free surface of the fingers ensures that the light of the camera illumination does not reflect. The low weight of the gripper also pays off: it has been the precondition that the available robot could be used again. In order to use the test cell as universal as possible, SCHUNK has additionally equipped the gripper fingers with a standardized jaw quick-change system, which allows a fast exchange of the gripper fingers, and that the plant can be retrofitted with a new spectrum of parts. In order to achieve a maximum cost efficiency, SCHUNK is the first supplier who offers fingers, quick-change systems, and the engineering design at an all inclusive price. Since components can be manufactured and re-ordered within a few days, this manufacturing process is excellently suitable for manufacturing prototypes, and wear- or replacement parts.

The perforation gripper handles sensitive parts

In addition to the individually designed special solutions, SCHUNK also uses the additive manufacturing process for further expanding its standard module program. The additively manufactured LOG gripper is the lightest gripper on the market, and is offered at an attractive price. Compared with conventional rubber perforation grippers it has been possible to reduce the dead weight by about 60%. Moreover, it disposes of higher holding forces, and allows longer service lives. The module can be compared with an expansion arbor, and is a one-piece design with an encapsulated, and therefore dirt resistant diaphragm system. Moreover, an internal stop protects the expansion diaphragm against damage. When the gripper is actuated with compressed air by an external or internal thread, the diaphragm expands, and affects the gripper jaws. Due to the frictional locking they ensure

secure hold. Since the polyamide jaws have large surface contact inside the workpiece, damages at the workpiece never happen. If the air pressure is reduced, the diaphragm automatically draws back to its starting position, and the gripping jaw releases the part again. The LOG gripper offers ideal prerequisites for handling sensitive parts such as sand cores. Its standard version is available for diameters between 20 mm and 40 mm. At a dead weight of 10 g to 135 g it can handle parts between 1 kg and 4 kg. Since it is equipped with connection threads, it can be quickly and easily assembled without needing any tools.

Polyamide cover for gripper stations

The additively manufactured components also open up new opportunities in the field of robot accessories. The active dirt cover SWD for example, protects changing systems with stored grippers against dirt, chips, grinding and welding dust. Instead of traditional dust covers with leather aprons, and swivel cylinders, the thin, weight-optimized and coolant-resistant polyamide covers do not require any additional attachment parts for mounting, and are tailor-made inserted and locked. They close tightly and no dust can enter the mechanics or the electric connections of the stroked effectors. They are offered with the smart dust covers in nine sizes for all quick-change systems SWS with payloads between 25 kg and 200 kg. On request, they are also available for other electric modules and pneumatic gripper change systems GWS. Due to the enormous advantages which can be achieved with generatively manufactured modules, SCHUNK is going to extend its standardized module program in the field of additive manufacturing. Particularly individual solutions will continuously be pushed forward, and will be designed even more creatively.

Polyamide fingers



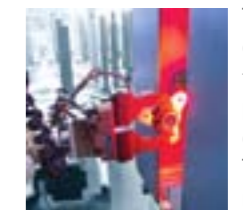
Individually, light, wear-free, and on request supply: The SCHUNK gripper fingers made of polyamide.



Handling

The additively manufactured SCHUNK gripper fingers can be individually adjusted to the workpiece.

Measuring cell



This measuring cell can inspect three different part features in one single step. The additively manufactured SCHUNK gripper

fingers avoid reflections of the camera light.

SWD



The SCHUNK dirt cover SWD closes the connection surfaces of the stored tools absolutely tightly.

LOGfamily



The SCHUNK perforation gripper LOG has optimized interfering contours, and is the lightest gripper on the market which is offered at an attractive price.

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MathWorks India to host MATLAB expo 2014 at Bangalore & Pune

MathWorks, a leading developer of mathematical computing software for engineers and scientists will host its premier annual conference, MATLAB Expo 2014 at Bangalore on 10th July at NIMHANS Convention Centre. The Pune event will be on 15th July at the Westin Pune Koregaon Park.

The conference will bring together engineers, scientists and partners to exchange ideas and explore the latest product capabilities in MATLAB



and Simulink. The EXPO features presentations by MathWorks technical experts and customers in India and an exclusive exhibition area showcasing cutting-edge demonstrations.

Jason Ghidella, Technical Marketing Manager, MathWorks, will present the keynote address entitled 'Directions in Technical Computing and Model-Based Design.' He will discuss how MATLAB and Simulink are equipping engineers and scientists to respond to challenges and opportunities arising out of mega technology trends such as big data, cloud and mobile computing, Internet of Things, low-cost programmable micro-processors, online education and more.

For the detailed agenda, visit matlabexpo.in.

MathWorks is the leading developer of mathematical computing software. MATLAB, the language of technical computing, is a programming environment for algorithm development, data analysis, visualization, and numeric computation. Simulink is a graphical environment for simulation and Model-Based Design for multidomain dynamic and embedded systems. Engineers and scientists worldwide rely on these product families to accelerate the pace of discovery, innovation, and development in automotive, aerospace, electronics, financial services, biotech-pharmaceutical, and other industries. MATLAB and Simulink are also fundamental teaching and research tools in the world's universities and learning institutions. Founded in 1984, MathWorks employs more than 3000 people in 15 countries, with headquarters in Natick, Massachusetts, USA.

For additional information, visit <http://www.mathworks.in/>

MTU Aero Engines' 2014 first-quarter revenue on previous year's level

MTU Aero Engines AG announced its 2014 first quarter revenue same as the previous year. Group revenues remained stable at €913.0 million (1-3/13: €906.0 million). MTU's operating profit in the first three months of 2014 amounted to €89.0 million (1-3/13: €88.3 million), resulting in an unchanged EBIT margin of 9.7%. Earnings after tax also reached the previous year's level, and amounted to €56.0 million (1-3/13: €55.5 million).

"The stable earnings in the first three months of 2014 allow us to confirm our full-year forecast," said Reiner Winkler, CEO of MTU Aero Engines AG. "Our first-quarter revenues were impacted by currency translation effects. An additional factor was the relatively high comparative 2013 figure for the commercial maintenance business, which was due to revenue deferrals. In the further course of the year, we expect revenues to grow to our forecast value of approximately €3.750 million."

In the OEM segment, revenues from both commercial and military engines were slightly up on the previous year. An increase of 2% to €500.5 million (1-3/13: €488.4 million) was reported for the commercial engine business, which includes engine manufacturing and spare parts. The engines that generated the highest share of revenues were the V2500 engine for the Airbus A320 family, the GP7000 engine for the Airbus A380, and the GENx engine for the Boeing 787 and 747-8.

Revenues in the military engine business increased by 4% to €116.6 million (1-3/13: €112.2 million) and mainly derived from the EJ200 Eurofighter engine.

Commercial maintenance revenues decreased by 3% to €303.6 million (1-3/13: €313.1 million). The main source of these revenues was the V2500 engine deployed in the Airbus A320 family.

The order backlog at March 31, 2014 amounted to €9,832.4 million, which corresponds to a production workload of almost three years. The majority of these orders concern the V2500 engine, and the PW1000G family of geared turbofan engines.

The latter are deployed in the Airbus 320neo, the Bombardier CSeries, the new generation of Embraer E-Jets, the Mitsubishi Regional Jet, and the Irkut MS-21.

In the first three months of 2014, MTU's research and development expenditure amounted to €43.3 million (1-3/13: €53.9 million). Company-funded R&D expenditure recognized as an expense in the income statement amounted to €21.7 million (1-3/13: €28.7 million). The geared turbofan programs represented the main focus of these R&D activities.

In the first quarter 2014, MTU boosted capital expenditure on property, plant and equipment by 37% to a total of €22.8 million (1-3/13: €16.6 million). "Here too, we have concentrated specifically on investments that will assure the company's future," said Winkler. "This money has been spent on projects related to the ramp-up of the geared turbofan programs, such as purchasing machinery for the blisk manufacturing facility and constructing a new logistics center in Munich, as well as expanding the capacity of MTU Aero Engines Polska."

The full-year forecasts for the financial year 2014 are unchanged. The MTU group expects to generate revenues of approximately €3,750 million (2013: €3,574.1 million), accompanied by stable operating profits (2013 adjusted EBIT: €373.1 million) and stable earnings after tax (2013 adjusted net income: €235.7 million).



Dassault Aviation rolls out 250th Falcon 7X

Another milestone in the Falcon 7X program was reached recently with the roll out of the 250th aircraft at Dassault Aviation's Charles Lindbergh Hall in Mérignac near Bordeaux, France.

The aircraft entered final assembly earlier this year. It will fly to the Falcon completion center in Little Rock, Arkansas in June and will be delivered to its customer before year's end.

"This latest milestone is testimony to the outstanding reception that the Falcon 7X has received in the business aviation community," said Eric Trappier, Chairman and CEO of Dassault Aviation. "Thanks to this enthusiastic support, the Falcon 7X has become our fastest selling business jet ever."

A total of 216 Falcon 7X's are currently in service in 34 countries around the world. The fleet has accumulated more than 250,000 flight hours since it was introduced in 2007.

The popularity of the Falcon 7X stems from the aircraft's unparalleled flying flexibility, operating economy and advanced technologies. The 7X was the first 100% digitally designed aircraft in business aviation and the first to be equipped with digital flight controls, and it remains the most advanced business jet in service today. It operates with ease from more airfields and with greater economy than any jet in its class.

"No other extra long range jet can match the 7X's short-field agility, fuel efficiency and handling qualities, more typical of a smaller super midsize jet than a large cabin aircraft," remarked Trappier.

The 7X consumes 15-30% less fuel than competing aircraft, cutting down significantly on operating costs. And thanks to its three-engine design, it can take shorter routes over water, saving valuable time and money on long transatlantic and transpacific trips.

The Falcon 7X can fly a typical approach at a slow 104 knots and land and stop in just 2,070 ft (631 m). It can do this at airports in hot and high locations and with steep approach and stringent noise restrictions. Its performance into and out of challenging airports like Aspen, Lugano and London City Airports make the 7X unique among the long range business jets and is particularly appreciated by operators flying to such destinations. What's more, this airport performance can be achieved while offering much more range.

These unparalleled flying qualities do not come at the expense of traveling comfort. Passengers often comment on the aircraft's extremely comfortable cabin and the impressively smooth ride conferred by digital flight control technology, which allow them to emerge fresh and relaxed from a long 12-hour flight.

Successful flight test of Agni-1

The Strategic Forces Command (SFC) of India launched an Agni 1 ballistic missile from test range at the Wheeler island, off the coast of Odisha, as part of regular training exercise. The missile took off in a perfect launch and reached the target point in Bay of Bengal meeting all the mission objectives successfully. The DRDO developed medium range ballistic missile is part of armed forces arsenal.

Mr. Avinash Chander, Scientific Advisor to Raksha Mantri, Secretary, Department of Defence R&D and DG DRDO congratulated the Strategic Forces Command and the DRDO personnel.



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HAL bets big on Dhruv helicopters



HAL expects a minimum of 100 civil Dhruv helicopters to be in operation in the next few years. “We have plans to set up separate division for servicing these copters. We have a separate export marketing group in the Corporate Office that looks after the export business. We have appointed a consultant to analyze the market potential for Dhruv”, says HAL Chairman R K Tyagi in an exclusive interview to Aeromag Asia.



Dr. R K Tyagi
HAL Chairman

Could you talk on the important non-military roles for Dhruv helicopter?

Dhruv is versatile helicopter and its non-military uses include casualty evacuation and rescue work, VIP transportation, airborne law enforcement, cargo transportation and gas / oil pipeline surveillance, aerial photography, aerial surveillance including coastal surveillance, geo-physical survey, personnel transportation, disaster management, heli-tourism. It can also be used as heli-taxi.

Please give a brief on the excellent role of Dhruv in the disaster relief operations

during the Uttarakhand tragedy.

When Uttarakhand tragedy struck, we deployed 44 helicopters in June and July 2013, out of which 28 were Dhruv. The operation “Rahat” was one of the largest rescue operations of its kind anywhere in the world. Our helicopters flew for nearly 630 hours and made 2,380 sorties over difficult terrain and in hostile weather conditions. During this period, HAL’s five member team was stationed at Deharadun to provide technical and logistical support.

I feel, all our helicopters, deployed over flood and landslide affected areas



in Uttarakhand performed effectively in dropping paratroopers, evacuating stranded people and in supply of food and medicines. The helicopters made sorties in the high risk zone overcoming strong winds, visibility and with virtually no space for landing on high terrains.

Dhruv which can carry 12-14 people was the star performer. On many occasions, due to incessant rain IAF pilots could only use Dhruv as it was unsafe for other copters to land. We are proud of it.

How many Civil version Dhruvs have been produced, and what is HAL vision & plans for marketing in India & abroad.

We have produced 15 Dhruv Mk I (civil version). Regarding our vision, I am glad to inform you that HAL is presently producing Mk III Dhruv. This helicopter would have civil certification and would be offered to our customers in due course. I expect a minimum of 100 civil Dhruv helicopters to be in operation in the next few years. We have plans to set up separate division for servicing these copters. Regarding overseas market, we have a separate export marketing group in the Corporate Office that looks after the export business. I am sure they keep track of development in the international market and position HAL products accordingly. In fact, we have appointed a consultant to analyze the market potential for Dhruv.

Why HAL has not so far sold Dhruv Civil to Indian Commercial Helicopter operators, such as Pawan Hans, Global Vectra etc and what are your vision & plans to market this proud product of

HAL to India customers, including state governments.

Dhruv helicopter has been produced in different versions – viz. Mk I, Mk II and Mk III. Dhruv Mk III utility version (skid) received its Initial Operational Clearance (IOC) in October 2010. We have initiated the certification process of Dhruv Mk III (civil version). The EASA certification of Dhruv Mk III is likely to take some time.

We are keen to have this product in the civil segment. HAL has held discussions with leading Helicopter operators for their future acquisitions in this connection. HAL’s civil helicopters sold to BSF are being operated by Pawan Hans.

What is the status of development certification and production of the Ambulance version of ALH, which was exhibited almost a decade ago?

A conceptual prototype for ALH in Air Ambulance role was made and flight trials were carried out earlier, subsequently configuration updates have been made and a type of aero medical equipments which need to be incorporated in the helicopters have been identified. Efforts are on for identifying a suitable partner for conversion of ALH as Air Ambulance. Developmental activities for certification of an Air Ambulance of ALH would be taken up after this.

With your experience with Helicopter, and vision to lead HAL to greater glory, what actions are being taken to strengthen the Helicopter Design Department, and accelerate the slow moving design & development projects?

HAL has charted-out a road map to make the Company a significant player in the field of helicopter design and development. Some of the steps planned to strengthen the Helicopter design department and accelerate design and development projects include R & D projects with DRDO labs, IITs, IISc; collaboration with academic institutions (IISc/IITs), HR initiatives, involving experts from academia and external industry in design and development activities; independent review of design and configurations by external domain experts; continuous involvement and interactions with stake holders and customers; upgrading and modernizing infrastructure dedicated to helicopter design and development.

HAL is investing more than Rs 300 crore in capacity and capability for upgrading Helicopter design and development in the next three years.

Further, HAL has also acquired 600 acres of land from Government of Karnataka, near Tumkur. A state of the art green field Helicopter manufacturing facility will be established at this location by HAL for catering to the expanding Helicopter business.

This plant will be self-contained unit integrating the manufacturing plants, the helicopter assembly shops, field service and flight testing facilities, MRO facilities and associated support infra-structure and a township.

All these steps are being initiated to ensure that HAL becomes a significant player in the Rotary Wing Design and Manufacturing in the global aeronautical field.

Success with Precision

Telephony, radio and internet using satellites – the ever increasing uses in the SatCom industry combined with the increasing demands on transmission capacity and operating conditions have led to a considerable growth in available dual channel rotary joints in the past few years. Such rotary joints are particularly important for SatCom applications, as they allow the simultaneous transmission of broadcasting and received signals through a single component between the base unit in the moving system (e.g. the aircraft, ship, vehicle) and the antenna adjusted in the direction of the satellite.

The trend for higher frequency bands and increasing capacity require new solutions such as compact waveguide-coaxial transmission line combinations, which could not be implemented previously. With all applications, the environmental conditions are also intensifying – for example the requirements on temperature range, moisture content, installation height, vibration and shock as well as corrosion resistance. On one hand, the solution can be found in a demanding interplay of ultra-precise milled and rotary parts, which are produced on modern SPINNER CNC machinery or in cooperation with specially selected precision suppliers. And on the other hand, in exact simulation methods, with which the design of such joints can be developed and verified according to the high demands.

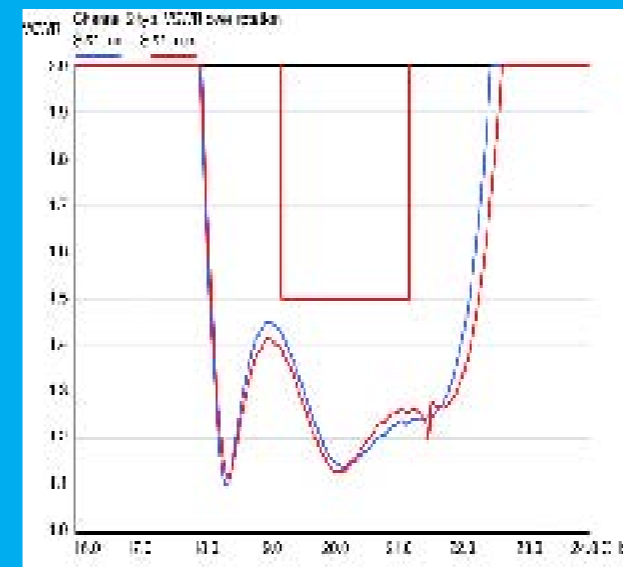
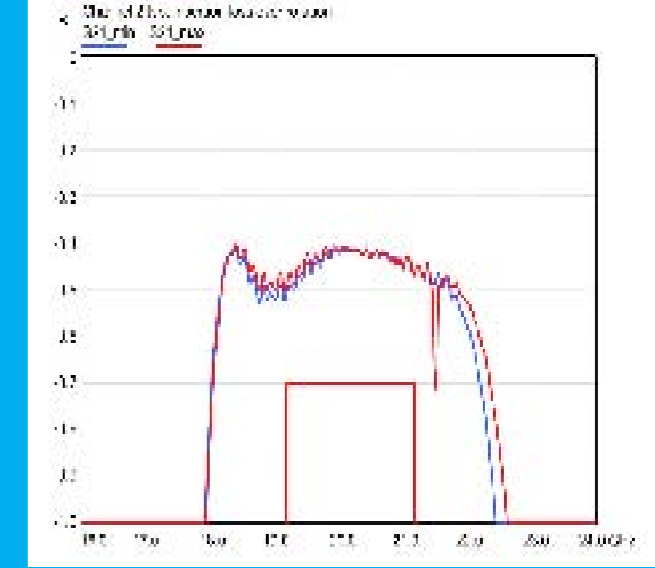
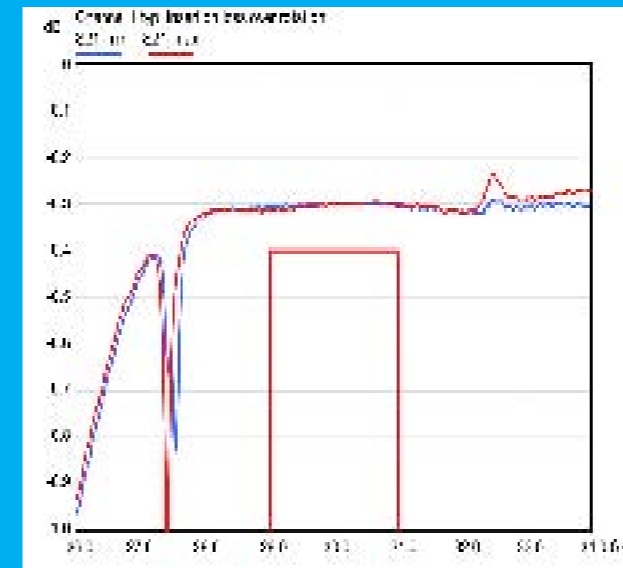
Wherever possible, SPINNER relies on precision, highly-integrated components, which combine many functions and are made up of minimal parts, thus minimizing the number of connections. This technology allows very good insertion loss values to be achieved, as a lower number of transition resistances also arise at the connections which have been reduced to a minimum. But the main advantage is that the precision



increases due to the lower number of fits, meaning the produced components can be created in good compatibility with the simulated geometries. This in turn allows the exact specification of RF values with just a slight individual need for adjustment of the end product. In comparison to years ago, adjusting elements are no longer considered a necessary evil and established empirically in the product development process. Instead, at the beginning of the design, they are consciously planned in reduced numbers in order to generate specifically determined product features or to

compensate economically for remaining incalculabilities in the μm sector.

To create precision engineering and microsystems, whose typical representative is a dual channel SatCom family, new production areas have been created, which deal specifically with connecting technology and the positioning of small components, offering the right conditions, such as cleanroom assembly. The high level of training at SPINNER, the exact description of all procedures, the consistent training of employees and the motivation of only wanted to achieve the best enable high-



Channel designation	Channel 1	Channel 2
Interface type	UBR320 (UG-599)	2.92mm female
Interface orientation	style I	style L
Frequency range	29.0 to 31.0 GHz	19.2 to 21.2 GHz
Average power capability ^{SR1)}	50 W	5 W
VSWR, max.	1.25	1.5
VSWR variation over rotation, max.	0.1	0.1
Insertion loss, max.	0.4 dB	0.7 dB
Insertion loss variation over rotation, max.	0.2 dB	0.2 dB
Phase variation over rotation, max.	2.0 deg.	2.0 deg.
Isolation, min.	65 dB	

quality production of smaller and medium-sized series through to larger production orders of many different products. The substantiated knowledge about functions and interactions of abstract components, which are often difficult to access for lay people in the field of radio technology, puts SPINNER at the peak of the RF industry and makes a high demand on its employees. A current product from the SPINNER SatCom dual channel portfolio is the rotary joint described below, which is optimized for use in the airborne SatCom sector and allows high transmission capacities even at great altitudes. Using non-contacting transmission technology in the coaxial and waveguide sector, signals can be transmitted securely and extremely durably in all fields of use. The product confirms to the demands of conventional aerospace standards in all fields.

Radio frequency channel characteristics
 SR1 Conditions: - Operating altitude if not pressurized, max. 55000 ft
 - The waveguide flange of the rotary joint must not exceed the defined maximum ambient temperature.

Selex ES launches TacSat Razor portable Antenna



Selex ES, a Finmeccanica company, has launched the TacSat Razor Antenna, an innovative solution to provide front-line forces with robust, lightweight, on-the-move, high performance tactical satellite communications to optimise communications.

Weighing around 1kg, the TacSat Razor Antenna uses patented product design to offer a rapid deployment antenna, with a maximum 20W power output in the UHF tacsat band. It is designed specifically for physically demanding battlefield conditions, whilst addressing the relevant radiation hazard standards.

Innovative and patented construction and deployment technologies make it easy and quick to deploy; and able to be operated in a "hands free" mode, keeping troops both ready for action and fully informed. The TacSat Razor Antenna can be simply attached to the side of a standard military rucksack. Alternatively, it can be mounted on a standard tripod or camera spike or on a vehicle using a magnetic mount.

Users simply pull a strap to launch the antenna from its housing. The antenna is withdrawn back into the container by pulling the same strap in the other direction. A modular construction facilitates cleaning and ease of repair in the field.

The TacSat Razor Antenna reduces time to deploy and snagging; and eliminates the soldier 'down time' incurred by less effective ergonomic designs. It is environmentally qualified to Mil Std 810-G and is IP68 rated for water immersion. An instruction manual is provided.



Air Dispatch CLC celebrates millionth load sheet milestone

Centralised load control specialist Air Dispatch CLC is celebrating the successful completion of its 1,000,000th load sheet.

The milestone was reached on April 16th 2014 with the production of a load sheet for Finnair flight AY617 from Helsinki to Copenhagen.

The Finnish national flag-carrier - one of Air Dispatch CLC's longest standing clients - was presented with a commemorative award to mark the occasion at the recent IGHC Ground Handling Conference held in Kuala Lumpur.

Nick Yeadon, CEO of Air Dispatch CLC, comments: "This landmark occasion highlights how Air Dispatch has expertly and efficiently established itself as a leader in the field of centralised load control services, seamlessly implementing solutions for airlines worldwide. This number is only set to multiply as our client base continues to expand."

Ari Kuutschin, Head of Ground Operations at Finnair, added: "Air Dispatch CLC is an excellent partner for Finnair and its flexible approach has ensured safety and accuracy since day one. I am very pleased Finnair was fortunate enough to have received the accolade of being the partner who reached the millionth load sheet with them. We look forward to being present when they reach the next million and beyond."

Since commencing operations in 2008, Air Dispatch has grown into one of the world's leading experts in centralised load control services for the airline industry.

The company currently operates two state-of-the-art centralised load control (CLC) centres in Prague, Czech Republic and Warsaw, Poland and works with a client base consisting of both legacy and new generation carriers.

From producing 44,685 load sheets in its first 12 months of business, the company has expanded and now generates nearly 450,000 load-sheets a year - delivered to over 200 airports on six continents.

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Airbus launches new ACJ319 corporate jet



Brings big-cabin comfort to broader market

Airbus has launched a new version of its popular corporate jet, the ACJ319, offering customers simplicity, speed and savings in the cabin. Called ACJ319 Elegance, the new version complements today's fully customisable version.

"Airbus corporate jets have always been great at enabling customers to take their lifestyles into the air, because they have the widest and tallest cabins of any business jet", points out Airbus Chief Operating Officer, Customers, John Leahy. "Our new ACJ319 Elegance makes it even easier and quicker for customers to realise the cabin of their dreams, by choosing from a wide range of seating and socialising options," he adds.

Elegance combines today's ACJ319 airframe with a new cabin that allows customers to choose from a wide range of lounge, office, dining and conference modules, complemented by a bathroom and galley at the front and a bedroom with ensuite bathroom at the rear.

This arrangement simplifies cabin layout

by allowing customers to quickly and easily create an arrangement that suits their needs and tastes, helping them to get what they want without having to invest a lot of time and effort. It also makes it easier for customers to upgrade their cabin later, simply by replacing one or more modules with others.

Airbus' ACJ319 is the most popular version of the company's corporate jet family, and the introduction of Elegance means that customers will have the freedom to choose between it and today's

fully customisable layout.

Cabin outfitting of the Airbus ACJ319 Elegance will be carried out by the company's Airbus Corporate Jet Centre (ACJC) subsidiary in Toulouse, which developed the concept, as a turnkey project for customer peace of mind. Customers for today's fully customisable Airbus ACJ319 will continue to have the freedom to choose from a wide range of cabin-outfitters, including a network of eight Airbus-approved cabin outfitters around the world.



Gulf Stream enhances customer support in Asia Pacific



Gulfstream Aerospace Corp. continues to enhance and expand its resources for operators in the Asia-Pacific region, which remains among the world's fastest-growing markets for Gulfstream aircraft.

On the eve of the third Asian Business Aviation Conference & Exhibition, Gulfstream announced that business has steadily increased for Gulfstream Beijing, its service center at Beijing Capital International Airport.

"Our fleet in Greater China has grown from 30 aircraft in 2008 to more than 130," said Gulfstream's Roger Sperry, regional senior vice president, International Sales, Asia Pacific.

"Growth like that means more demand for regional service and support. We are committed to providing more of that year after year."

Since opening in November 2012, Gulfstream Beijing has grown to 45 employees, including more than 20 technicians, and continues to support

Gulfstream operators on-site and across Greater China. In December 2013, the facility earned Civil Aviation Administration of China (CAAC) approval for 1A through 6A inspections for the G550, G450 and G200.

"Our Gulfstream Beijing staff has had more than 200 aircraft visits in less than a year-and-a-half of operation," said Mark Burns, president, Gulfstream Product Support. "CAAC facility certification for our new aircraft, the ultra-long-range, ultra-large-cabin G650 and the super midsize G280, is expected this year."

Since April 2013, Gulfstream has increased its parts and inventory in the Asia-Pacific region by approximately \$10 million to nearly \$67 million positioned over four distribution points, Beijing, Hong Kong, Singapore and Bangalore, India.

Recently, the company appointed Bill Guo as its second field service representative (FSR) in China. He will respond to the maintenance needs of customers based in and traveling through

Shanghai and surrounding areas. In China, Guo joins Jenson Saw, who has been based in Beijing since January 2010. Gulfstream also has FSRs in Hong Kong (three), Singapore (one) and India (one).

Gulfstream's presence in Asia Pacific also includes factory-authorized service centers in Hong Kong and Singapore, both Jet Aviation facilities; and authorized warranty maintenance facilities

Metrojet in Hong Kong; ExecuJet in Melbourne and Sydney, Australia; JAMCO in Sendai, Japan; and Air Works in Mumbai, India. Later this year, Jet Aviation plans to open a new maintenance hangar alongside its current maintenance and FBO operation in Singapore.

The expanded facility will accommodate up to five of Gulfstream's largest aircraft, the ultra-large-cabin G650. Also in Hong Kong, FlightSafety International operates a Gulfstream Learning Center for technicians and pilots that features a level-D qualified full-flight simulator for the G550 and G450.

Honeywell expands Asia Pacific aftermarket support with Bombardier

Honeywell Aerospace has strengthened its authorized service center network in Asia Pacific through an agreement with Bombardier Aerospace's Singapore Service Centre. As part of the agreement, Bombardier's newest wholly-owned maintenance facility will offer retrofit, modification and upgrade (RMU) services for Honeywell products to Bombardier business jet operators in the region.

The expansion of support for Bombardier aircraft in Asia Pacific means operators in the region will save time, and see lower operational costs as a result of reduced fuel consumption. Logistical arrangements will also decrease since operators will no longer have to leave Singapore for complex avionics upgrades.

"As the Asia Pacific business aviation market grows, there is an increased need to provide aftermarket support to our Bombardier aircraft operators," said Andy Gill, senior director, Asia Pacific, Business & General Aviation, Honeywell Aerospace. "This expanded collaboration with Bombardier's Singapore facility will allow us to offer customers better support and greater access to services, driving down

operational costs now and in the future."

Increased Growth and Support in Asia Pacific

Asia Pacific business jet fleets have been growing at double-digit percentage rates throughout the past five years. According to Honeywell's 2013 Global Business Aviation Outlook, continued long-term growth is expected for the region, making increased services and support vital to aircraft owners in this market.

"We continue to expand our support of our aircraft utilizing Honeywell products and services in Asia Pacific so that operators have the ability to easily make upgrades to their aircraft at all times," said Stan Younger, vice president, Bombardier Aircraft Service Centres. "Our Singapore facility has very quickly ramped up to provide an extremely broad range of services. Our facility has received extensive certifications from international authorities, and the agreement with Honeywell brings further value and convenience to our customers."

Bombardier Support for Honeywell RMUs

Honeywell RMUs enhance aircraft safety, reliability and hull value while lowering operational costs. The RMU services will cater to approximately 150 existing and new Bombardier-manufactured business jets across the region, including the following aircraft types: Global Express*, Global Express* XRS*, Learjet 75* and Challenger* series aircraft. Customers will be able to take advantage of the following upgrades:

- Primus Elite 875 cockpit display upgrade to liquid crystal display from cathode ray tube
- Flight Management System Service Bulletin upgrades incorporating three major enhancements: Future Air Navigation System (FANS), Wide Area Augmentation System-Localizer Performance with Vertical Guidance (WAAS LPV) and Automatic Dependent Surveillance-Broadcast (ADS-B)
- Satellite Communication Inflight Voice and Data Solutions ranging from Inmarsat Aero H and Aero H+ to Iridium
- Ovation Select cabin management system

Later, he addressed the senior officers of HQ CAC and the Commanders under the jurisdiction of CAC on his perspective and shared his vision to transform IAF into a potent strategic aerospace power.

The CAS thereafter went around the campus and reviewed the progress of various ongoing Works Services Projects relating to administrative and operational preparedness. The Air Chief Marshal expressed satisfaction on the infrastructure facilities and working environment of the Command.

VSM ADC Air Officer Commanding-in-Chief, CAC and Mrs. Harminder Chauhan, President AFWWA (Regional) along with the key personnel at Bamrauli Airport. The CAS reviewed a ceremonial 'Guard of Honour' presented by the air warriors.

On his arrival at HQ CAC, the Air Chief addressed all personnel including civilian employees in a Hollow Square Parade held at Headquarters lawn. In his address, he emphasized on the Man-Mission-Machine interface and advised the personnel to continue the momentum in bringing the CAC as a potent strategic command.

Air Chief visits Central Air Command

Air Chief Marshal Arup Raha PVSM AVSM VM ADC Chief of the Air Staff and Mrs Lily Raha, President Air Force Wives Welfare Association (AFWWA) were in Allahabad recently on an official visit at Headquarters Central Air Command.

Air Chief Marshal Raha earlier had tenure in Allahabad in the capacity of Air Officer Commanding-in-Chief and it was a privilege for HQ CAC to host him as CAS. The CAS and President AFWWA arrived by service aircraft and were received by Air Marshal J Chauhan PVSM AVSM

SIATI: a gateway for aerospace units



Founded in 1991, Society of Indian Aerospace Technologies and Industries (SIATI) is the only Industrial Association of Aerospace Companies in India with the patronage of major aerospace

organizations such as Hindustan Aeronautics Ltd. (HAL), Indian Space Research Organization (ISRO), DRDO Labs, Aeronautical Development Agency (ADA), National Aerospace Laboratories (NAL), and Civil & Military Airworthiness Quality & Certification Agencies.

A professionally managed non-profit, non-commercial organization, SIATI also work closely with Aero Society, FICCI, CII and other industry associations in the context of Government policy, formulations / modifications for the growth of Aerospace Technology and business.

SIATI is the largest industrial Association which is constituted to promote and encourage the growth of aerospace technologies and industries in India. It facilitates and promotes the growth of Aerospace industries, technologies and education in India, academia – industry and R&D Industry interactions and international co-operation.

- ✦ Create awareness among the members on the business opportunities, industry requirements and technology trends.
- ✦ Showcase collective strength in terms of capabilities, products and services of Indian Aerospace companies in the domestic and international.
- ✦ SIATI represent effectively the Indian aerospace industry in all appropriate forums for its healthy growth by organizing interactions and deliberations between Government bodies, policy makers, regulatory authorities etc.
- ✦ SIATI is the gateway for private / public partnership and international co-operation.

SIATI's members are involved in manufacture of aircraft, helicopter, engines, structures and systems and equipment as well as repair and overhaul, and design, analysis, embedded systems and other software solutions.

Members include MRO companies and education providers, a large number of small and medium scale industries involved in component manufacturing, machined parts, sheet metal, composite and metallic structures, rubber and plastics parts, batteries, PCBs, cables, connectors, electric and electronic products, instruments, for both civil and military aircraft.

SIATI is an important 'Gateway' to Indian Aerospace business and Global co-operation for tie-up in R&D, Technology, Joint Ventures, Collaborations, Co-productions and information-exchange.

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. Membership is restricted to industries / institutions and is not available in SIATI for

individuals (Those who would like to take individual professional membership are recommended to Join Aeronautical Society of India). All Industry / Institution members can avail services from SIATI with respect to:

Development and production of aerospace materials, equipment, structures, etc for both Indian and Overseas customers.

Assistance in building international collaboration for technology tie-ups and Joint Venture.

Platform for interaction with Indian R&D, Academia and industry for technology and business development.

Active participation under the EU India Co-operation projects industry collaborations and reciprocity of Airworthiness certification. Export Promotion through Offset/Counter Trade Agreements and forum for interaction with Government, HAL & STC in this matter. Provide platform for developing a consortium to share expertise and costly processing facilities to facilitate enhanced sourcing from India. Interaction with Government for policies conducive for development of aerospace technology R&D & business. Work for DGCA FAA, reciprocity and similarly DGCA BCAR\AA reciprocity.

Participate in workshops and training programs for Quality Certifications like ASA9100, DGAQA, and CEMILAC certifications.

Training in specific fields for e.g. Machining, Welding, Casting, Forgings, Rubber & Sealant technology, structural assembly technology, CAD CAM.

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.

Managing Committee

The Managing Committee of SIATI consists of eminent persons drawn from various Indian Aerospace Organizations - Hindustan Aeronautics Ltd., Indian Space Research Organization, Aeronautical Development Agency, National Aerospace Laboratories, Airworthiness Agencies, and private industries.

Dr.C.G.Krishnadas Nair, former Chairman of Hindustan Aeronautics Limited, is the founder and Honorary President of SIATI. The managing committee of SIATI consists of eminent personalities drawn from cross section of the aerospace industry and organizations to plan and monitor the activities of SIATI. Empowered committees headed by experienced professionals are formed from among members for all important domains of Aerospace to pursue SIATI member communities interest in these domains and update the members on the latest developments and business opportunities in those domains, and to interact with Government on offset and other policy and regulations, and for co-operations / consortiums among members, conduct of seminars, participation in exhibitions, training & skill development, and for international co-operation.

For membership and other details, please contact:

Hony. Secretary General - office@siati.org / jv@siati.org

HAL sets up a Faculty Chair at IIT Kharagpur



In a novel initiative to conduct applied research and tackle multi-disciplinary problems in the field of aerospace technology and its applications, HAL has entered into collaboration with IIT Kharagpur to set up a Faculty Chair.

The Chair will be set up at the department of Aerospace Engineering. "Our intention is to promote R&D and academic work in new and emerging technologies in aerospace industry focusing in the field of radar, electronic warfare, avionics and aerospace systems. A strong research base already exists at IIT, Kharagpur, in the areas of direct relevance to the future programmes of HAL and this tie-up will be mutually beneficial", said Dr. R.K. Tyagi, Chairman, HAL.

The MoU was signed by Dr. Pratha Pratim Chakrabarti, Director (IIT, Kharagpur) and Ms S. Thenmozhi, General Manager, HAL.

The HAL Chair will be responsible for carrying out research in various areas related to aerospace technologies, facilitating technical consultancy, training programs and addressing other mutually agreed activities relevant to the HAL. IIT-KGP will appoint a distinguished academic from the relevant branch of engineering as the Chair Professor for a period of three years.

The HAL Chair will also initiate new

academic/training programs; identify and initiate specific research & development at IIT-KGP in the specific technical areas, provide technical consultancy to HAL, facilitate development of training programs and training modules including mentoring/coaching of HAL personnel for knowledge updation and capacity building. The chair will conceptualise and facilitate annual conference of defence related industries to provide platform to air new ideas, innovations, technologies etc.

The Chair will make efforts to conduct short-term courses by international faculty for the students of IIT-KGP and engineers/professionals of HAL to broaden their knowledge base in relevant new and emerging areas of the aerospace. In the event of proposed R&D activities resulting into contemplation and development of a new technology, product, equipment or process etc, it shall be duly patented with patent ownership in the joint name of HAL and IIT-KGP. The details of its commercial utilization shall be worked out mutually on case to case basis.

HAL has already established three chairs at IIT Roorkee, IIT Kanpur and National Law School of India University (NLSIU), Bangalore. It is also planning to establish a Chair at IIT, Bombay shortly.

Ansysis honours students with Simulation award

ANSYS congratulated the teams competing in the BAJA SAE India all-terrain vehicle (ATV) development contest by presenting them with an Engineering Simulation award. Team Nemesis from the College of Engineering at Pune University and Vellore Institute of Technology's Team Kshatriya successfully leveraged ANSYS simulation for their individual ATV designs. Teams don't typically have the time or funds to build multiple prototypes, so employing engineering simulation fosters increased design reliability and performance at a low cost, within tight deadlines.

Specifically, Team Nemesis used ANSYS Mechanical to analyze its vehicle's suspension components, chassis, gearbox casing and brake pedal to reduce the weight of its ATV while ensuring maximum strength. Also taking advantage of ANSYS Mechanical, Team Kshatriya focused on incorporating a lighter and stronger alloy for its roll cage and used computational fluid dynamics technology to optimize the performance of its ATV components as a system.

"ANSYS instituted the Engineering Simulation award in 2010 to recognize student competition teams and organizations who take advantage of simulation to optimize their designs, whether it's an ATV or formula-type race car," said Murali Kardiramangalam, academic program director at ANSYS. "These contests are crucial to facilitate learning simulation outside of the classroom and by providing software, training and support to these teams, ANSYS is helping to nurture the next generation of innovative engineers."

BAJA SAEIndia is a national competition organized by the Society of Automotive Engineers (SAE). This year's event was held at NATRIP in Pithampur, Indore, India, with 327 teams officially registered and only 125 teams qualifying for the final race.



Astra successfully test fired from SU-30MKI

India's first indigenously developed Beyond Visual Range (BVR) Air-to-Air missile Astra was successfully test fired by the Indian Air Force from a Naval range in the western sector meeting all the mission objectives. The air-launch was captured by side and forward looking high speed cameras and the separation was exactly as per the simulation.

Astra is India's first BVR Air-to-Air Missile indigenously designed and developed by DRDO, possessing high Single Shot Kill Probability (SSKP) making it highly reliable. Astra is an all aspect, all weather missile with active Radar terminal guidance, excellent ECCM features, smokeless propulsion and process improved effectiveness in multi-target scenario making it a highly advanced, state-of-the-art missile.

The Scientific Advisor to Raksha Mantri, Secretary Deptt of Defence R&D and DG, DRDO, Mr. Avinash Chander, congratulating the team for their high competence and tenacity to make such an event happen seamlessly, said "Astra's successful launch from the Su30 combat aircraft is a major step in missile aircraft integration. Extensive flight testing that has preceded the air launch was indeed a joint effort of DRDO and IAF. This will be followed by launch against actual target shortly. Many more trials are planned and will be conducted to clear the launch envelope. Weapon integration with 'Tejas' Light Combat Aircraft will also be done in

the near future."

Dr. V.G. Sekaran, Director General (MSS) who chaired the Flight Readiness Review Committee along with Mr. S Som, Director, DRDL, Mr. P Venugopalan, former Director, DRDL among others, said "This is one of the proud moments for DRDO and the entire country." Dr. K Tamilmani, Director General (Aeronautics) who has oversaw the entire flight safety in the program said that quality of integration and performance is of high standards and there was no doubt in the success of the launch.

He further added that this is the beginning of the phase for demonstration of launch over a wide air-launch envelope.

The Project Director Dr. S. Venugopal said that "the Air Launch of Astra was perfect in all respect and is a culmination of years of effort by a very dedicated and competent team of the Missile Complex, Hyderabad, CEMILAC and Indian Air Force. HAL carried out the modification in Su-30 along with IAF specialists, and many Indian industries have an important and enabling role in the production of reliable avionics, propulsion system, materials, airframe and software passing stringent airworthiness requirements for the missile." The missiles have undergone rigorous testing on Su30 in the captive mode for avionics integration and Seeker evaluation in 2013. The project has thus reached the final stage of testing and evaluation, and the Mk-II variant with higher range capability is also planned to be tested by the end of 2014.

MTU Aero Engines Polska celebrates five-year anniversary

Five years ago, in April 2009, MTU Aero Engines Polska started production of the first engine components for Germany's leading engine manufacturer. Today the development of MTU Aero Engines' facility in Rzeszów is an unprecedented story of success and growth. The facility started operations with about 200 employees; today MTU Aero Engines Polska has a highly skilled workforce of about 500 people. And due to the expansion plans of the company 250 new jobs are expected to be created in Rzeszów by 2020. MTU's affiliate in Poland's "Aviation Valley" focuses on activities including engineering and parts manufacturing, module assembly as well as parts repair. The latest addition to MTU Aero Engines Polska's portfolio is linked to the IAE upshare for the V2500 engine; to this the major work share includes logistics, procurement, engineering and supplier quality.

"The business volume at our location in the Polish Aviation Valley exceeded our expectations. The facility plays an important role in our sourcing strategy regarding our established engine components with a higher labor-intensive work share. Therefore we will expand our activities on-site to support our current ramp-up activities. Further we will expand the R&D department and recruit for example about 40 additional development engineers," summarizes Dr. Rainer Martens, Chief Operating Officer, from a MTU group perspective. "We can rightly be proud of the success achieved by now, in only five years after the official opening. This would not have been possible without the hard work and outstanding teamwork of our employees and the support we received from our Munich colleagues," said Krzysztof Zuzak, managing director of MTU Aero Engines Polska, on the occasion of the site's five-year anniversary.

And the success story will proceed. MTU Aero Engines Polska will add a new, 9,200-square-meter building, which will increase the area occupied by buildings by 50 percent. The total investment that goes into the project amounts to some 40 million euros.

Unmanned Aerial Vehicles

State of the Art and Road to Autonomy



Prof. C. Subramanian

An unmanned aerial vehicle (UAV) is an aircraft which uses aerodynamic forces to provide lift and without a pilot to control on board. Its flight is controlled either autonomously by onboard computer or remotely controlled from the command centre on the ground or another vehicle. It may be expendable or recoverable. The launch and recovery of a UAV can be through an automatic system or an operator on the ground. It can carry a nonlethal or lethal payload based on the mission. It is deployed to perform civil, military and paramilitary operations. The military operations include reconnaissance, aerial photography and attack missions. They are used in many civil operations such as firefighting, rescue operation at flood affected areas, surveillance of pipelines, anti-poaching and nonmilitary security work. The main advantage of UAV is risk reduction due to loss of life while flying in high threat environments. They are often preferred for missions that are too dull, dirty or dangerous for piloted aircraft. In an aircraft the pilot becomes the limiting factor in performing certain airborne tasks as the military missions could be dull due to limiting factor of crew endurance, dirty due to certain missions such as the one with the need to collect radioactive samples by flying over zones soon after explosion and missions of reconnaissance sorties over highly dangerous and politically sensitive areas. UAV has the potential to be a force multiplier by synergizing the armed services to optimize deployment of

resources. With the increase in variety of missions and corresponding operational requirements Unmanned Combat Aerial Vehicles (UCAVs) are being developed to carry and deploy weapons on the designated targets. The term Unmanned Aircraft System (UAS) is used to refer to the gamut of UCAV fitted with weapons and mission specific payloads, satellite connectivity and ground stations. In this paper the aspects pertaining to UAV discussed are: its role in modern warfare, classification, scenario in India, its potential exploitation and research and development opportunities.

Role of UAV in Modern Warfare

The UAVs can be deployed for wide-ranging tasks productively in a coordinated way. It can provide enhanced battle management capabilities such as better situational awareness, target acquisition and battle damage assessment. The associated tasks include surveillance of air fields, radars, air defence guns, field defences; deception by using electronic payloads, destruction of selected targets by loitering missiles, and post strike damage assessment. They can also be deployed to provide inputs about any intrusions on the Line of Control (LoC) and on terrains which assist in defence planning. As militant groups hide and operate in areas of thick foliage, it is essential to obtain high quality images through payloads such as Synthetic Aperture Radar (SAR) and such

information will be valuable while planning anti-insurgency operations. UAV can be weaponised to destroy hostile targets with precision. In this regard, recent examples include the UCAV operations which caused accurate destruction of enemy targets in Afghanistan.

Classification of UAV

The UAV can be classified into various tiers based on the operational requirements. Tier I comprises Small UAV (SUAV) operational at low altitude with long endurance. Tier II consists of medium altitude and long endurance (MALE). Tier II+ has high altitude and long endurance (HALE) with a typical ceiling of 65,000 ft and endurance of 48 hours. Tier III is a high altitude and long endurance low observable UAV. Tactical Unmanned Aerial Vehicle (TUAV) is a system capable of day and night operation with reconnaissance, surveillance, and target acquisition functionalities. The functional capability of a UAV related to a mission is determined by the payload which it can carry and effectively deploy to accomplish the mission. For example, in order to undertake typical missions and the payloads with support Software to be carried are: (1) for surveillance, Charge Couple Device cameras an SAR, (2) for Electronic Intelligence (ELINT), onboard passive equipment and (3) hunter killer, high precision sensors and explosives. UCAVs are developed to carry mission payloads especially weapons to be deployed on



enemy targets. Due to stringent operational requirements and physical constraints of real estate to build airports and runways, in due course vertical take-off and landing (VTOL) UAVs are expected to be available for deployment.

UAV Scenario in India

All the three Indian armed services acquired UAVs from foreign sources in the recent past and have been operating. This included Searcher Mark I, Searcher Mark II and Heron of the Indian Army and Indian Air Force (IAF) and Searcher Mark II and Heron of the Indian Navy. Meanwhile, the indigenous initiative commenced with tasking DRDO to develop and produce catapult launched UAV and then, upgrading its operational capability. It is reported that the IAF has acquired Harop which is a flying missile capable of exploding itself on a designated target. DRDO has also developed Nishant and is presently developing Rustam. The Nishant is launched from a vehicle and recovered by parachute and could be utilized in the plains. Table 1 below depicts the India scenario of Design and Development of UAV and the organizations associated with it.

While the requirements continue to emerge, the debatable point would be the road map for the procurement of UAV either by import or indigenous development. The points worth consideration are: (1) UAV of low and medium complexity of technology could be indigenously developed. (2) Advanced category of UCAV may be manufactured with the support of sources ready to cooperate. The Indian SMEs should be encouraged for participation in the manufacture and development of UAVs.

Exploitation of Potential of UAV

It has been reported that the Royal Air Force (RAF) in UK would be replacing 30 percent of the strength of fighter aircraft by UCAVs. The US Navy has plans for deploying UCAS. These are indicative trends. Future requirements of UAVs of the Indian Armed services are expected to include UCAV and VTOL- UAVs fitted with payloads appropriate for the mission.

Research and Development

The trend has set in for deployment of future generation of UAVs for more complex missions such as air combat, target detection, recognition and destruction; electronic attack; network communications; aerial delivery; marine warfare; mine warfare and airlift. The current research and development is mainly focused on enlarging the flight envelop and reducing the vehicle size. The R and D activities in various countries are directed towards the development of (1) UCAV with high speed and high maneuverability and (2) micro air vehicle (MAV). As the technology keeps changing so do the requirements. The R and D areas mainly for enhancing autonomy of UAV operation are given.

1. Downsizing ground equipment. Ground Control functions of station to be on laptops.
2. Sensor fusion. Combining information from various sensors for decision making
3. Communication. Communication to support coordination between multiple agents for net-centric operation
- 4.. Collaborative and Coor-dinated System (CCS). Environment providing situational awareness for facilitating UAV operations.
5. Path planning. Optimization of path for accomplishing missions

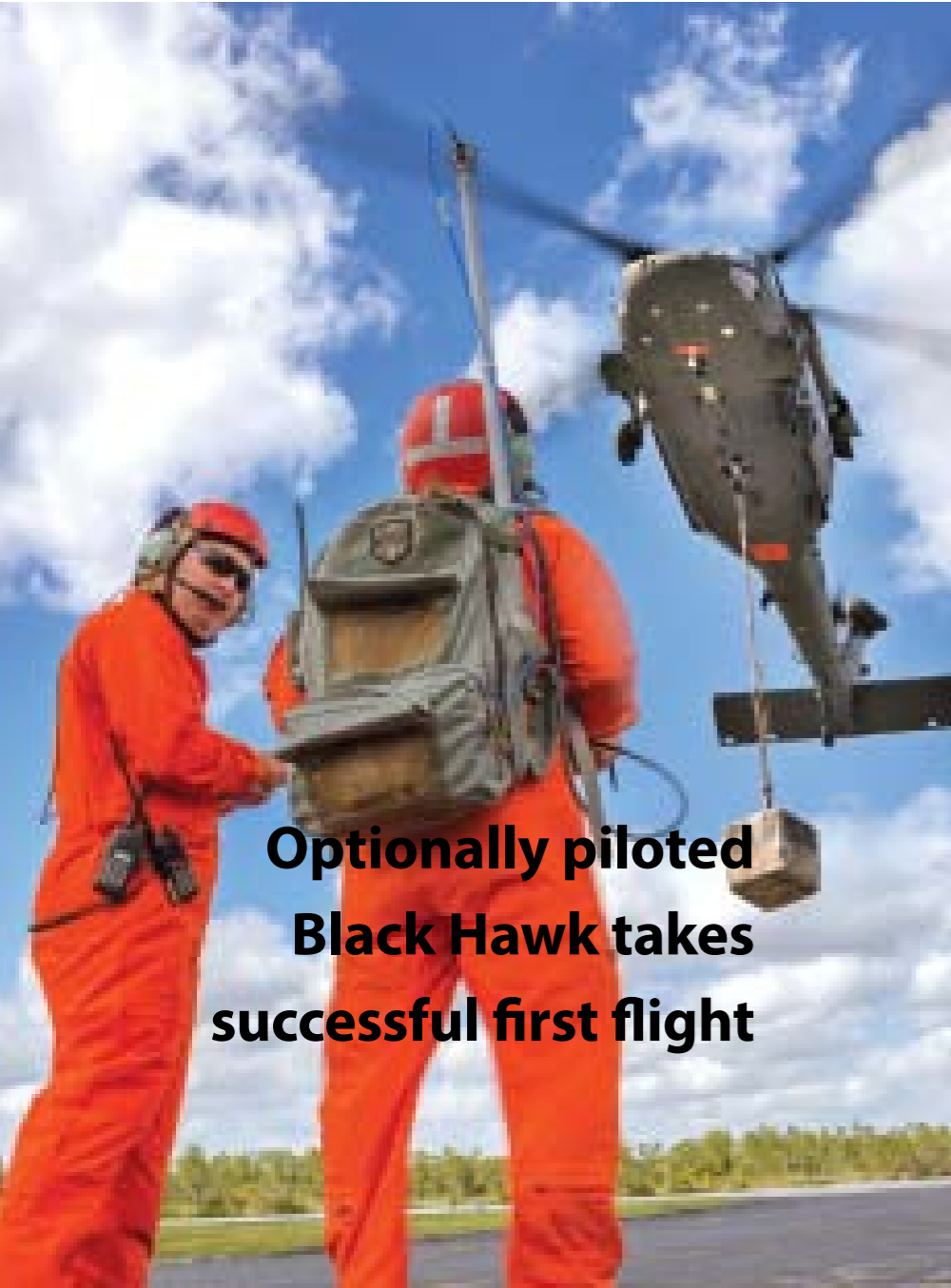
6. Trajectory Generation. Optimal control maneuver to follow a given path
7. Task Allocation and Scheduling. Optimal distribution of tasks amongst a group of agents partaking in operation
8. Cooperative Tactics. Formulating an optimal sequence and distribution of activities between the agents to achieve mission success
9. Intelligent Mission Man-agement (IMM): More the intelligence packed into a UAV, the more complicated the task that it can accomplish and the less human supervision required
10. Teaming and Swarming Forming groups of MAVs to team up in order to accomplish a specific task
11. Affordability. Lower costs for UAV can enhance its operational employment potential

6. Conclusions

Lowering the operational risk, improving the confidence in mission success and en-larging the scope of usage of UAV in peace and war conditions are the main motivating factors for continued interest of all concerned stakeholders. The effective and successful use of UAV during many recent operations shows a clear direction for future use of these vehicles. The Indian Armed services have been reported to have drawn a road map and are expected to hold a substantial numbers of vehicles in their inventories in the near future. Research in the areas associated with UAV has been vigor sly pursued in various parts of the world and the results have been encouraging.

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Optionally piloted Black Hawk takes successful first flight

Sikorsky Aircraft Corporation in cooperation with the U.S. Army, has successfully demonstrated optionally piloted flight of a Black Hawk helicopter, a significant step toward providing autonomous cargo delivery functionality to the U.S. Army.

The Optionally Piloted Black Hawk (OPBH) Demonstrator, known as Sikorsky's Manned/Unmanned Resupply Aerial Lifter (MURAL) Program, conducted the successful first flight demonstration at Sikorsky's Development Flight Center. The demonstration was conducted through the use of Sikorsky's Matrix™ Technologies and advanced Ground Control Station (GCS) Technologies.

The OPBH demonstrated autonomous hover and flight operations while under the control of a man-portable GCS, demonstrating the capability for

expeditionary operations and critical cargo resupply. "The autonomous Black Hawk helicopter provides the commander with the flexibility to determine crewed or un-crewed operations, increasing sorties while maintaining crew rest requirements. This allows the crew to focus on the more 'sensitive' operations, and leaves the critical resupply missions for autonomous operations without increasing fleet size or mix," said Mark Miller, Sikorsky Vice President of Research & Engineering.

The MURAL Program is a cooperative effort between the U.S. Army Aviation Development Directorate (ADD), the U.S. Army Utility Helicopters Project Office (UH PO) and Sikorsky. The UH PO is providing access to two UH-60MU Black Hawk helicopters and Sikorsky is applying the technology it has developed with Internal Research and Development

funding. Sikorsky has been developing the technology since 2007, and signed a Cooperative Research & Development Agreement (CRADA) with the U.S. Army in 2013 to advance the program to a formal effort to demonstrate the full flexibility and value of a full authority flight control system. The effort includes demonstration of expeditionary ground control systems and precision control.

"The ADD's mission is to focus on developing, demonstrating and applying critical technologies that enhance the capability, affordability, readiness and safety of Department of Defense aviation systems," said Dr. William Lewis, Director, ADD. "The optionally piloted Black Hawk helicopter functionality stands to bring added value to DoD aviation systems, through the innovations being tested on the Black Hawk helicopter in the MURAL program."

Air Marshal S R K Nair takes over as senior

Air Staff Officer

Air Marshal S R K Nair, AVSM, VSM has taken over as Senior Air Staff Officer, Headquarters Training Command in Bangalore. The Air Marshal belongs to Thiruvananthapuram and he did his schooling from Loyola School. He is an alumnus of National Defence Academy, Khadakwasala and was commissioned in the Transport stream of the Indian Air Force in Jun 1980. The Air Marshal has flown Otter, Avro, An-32, Dornier and IL-76 in addition to trainer aircraft and has over 7000 hours of flying experience. He is a Qualified Flying Instructor and has also been an Air Force Examiner.

As Senior Staff Officer, he has the onerous responsibility to train officers, airmen and non-combatants of the entire Air Force. With the IAF undergoing rapid modernisation at an unprecedented pace, the challenge is to churn out technologically competent and combat oriented airwarriors to meet the operational needs of the Indian Air Force.

The Air Marshal has held various appointments which includes Chief Operations Officer of a Transport Base, Commanding Officer of a Strategic Airlift Squadron, Director Operations (Transport) at Air Headquarters, Air Officer Commanding of Air Force Station Chandigarh, Assistant Chief of Air Staff (Personnel Airmen and Civilians) and Assistant Chief of Air Staff Operations (Transport and Helicopters) at Air HQ before assuming the present appointment.

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HAL hands over Dornier (DO-228) "Nabhratna" to DRDO ahead of schedule

HAL hands over Dornier (DO-228) "Nabhratna" to DRDO-LRDE (Bangalore) ahead of schedule. HAL produced Dornier (DO-228) aircraft "Nabhratna" has been handed over to Defence Research and Development Organization (DRDO) ahead of schedule at a program in Kanpur. Dr. R.K. Tyagi, Chairman, HAL presented the keys of the aircraft to Mr. Avinash Chander, Scientific Advisor to Raksha Mantri in presence of senior officers from HAL, DRDO and other Defence establishments.

Speaking on the occasion, SA to RM, hailed HAL for being proactive and delivering the aircraft six months ahead of schedule. "We needed this aircraft much more than anything else for testing of radar in air as we had to depend on others to loan the aircraft. Thanks to HAL, our dream has now been realized. The use of flying test bed (FTB) aircraft will reduce the cycle time for development for airborne system", he said. "Money invested for the aircraft will give us returns many times more as the aircraft will prove its worth in the months to come", he added.

Assuring the continued support of HAL, Dr. Tyagi said the aircraft is aptly named Nabhratna and DRDO will find it extremely useful. "The aircraft will be used by Bangalore based Electronics and Radar Development Establishment (LRDE) as flying testbed (FTB) for evaluation of performance of various radars being developed by LRDE. This aircraft is equipped with indigenous synthetic Aperture Radar and state-of-the-art avionics and communication system", he added.

Dr. K. Tamil Mani, DRDO Director General (Aero), said partnership between HAL and DRDO on various platforms would continue. "Our confidence stands vindicated when we see the targets at HAL are met with complete dedication", he felt.



Dr. R.K. Tyagi, Chairman, HAL (third from left) handing over the keys of DO-228 to Mr. Avinash Chander, Scientific Advisor to Raksha Mantri (centre)

HAL manufactured DO-228 is a highly versatile, multi-purpose, fuel efficient, rugged, reliable and light weight twin turbo prop transport aircraft. HAL-Dornier-228 aircraft is being extensively utilised by Indian Coast Guard, Indian Navy and Indian Air Force in variety of applications and is a proven workhorse. There is hardly any utility application in which this aircraft has not been used by these services. DRDO selected DO-228 aircraft as Flying Test Bed for testing of airborne radars based on these qualities. A contract for supply of one aircraft along with spares, tools and publications was signed by HAL with LRDE on May 30, 2013.

Needs of LRDE fulfilled

Whenever LRDE needed to test any radar under development, they would approach Indian Navy or Indian Coast Guard for loan allotment of DO-228 aircraft for limited period. It was difficult to spare the aircraft because of operational needs resulting in delay in the development of radars. In view of this LRDE decided to procure one DO-228 aircraft on their own for testing of radar in air. The LRDE aircraft has been produced by HAL in little less than a year

since finalisation of agreement.

Production details of HAL-DO-228

The agreement for license to manufacture DO-228, Light Transport Aircraft, at HAL, Kanpur was signed on November 29, 1983. The production of this aircraft was started in 1984 and HAL's Kanpur Division has delivered 124 such aircraft. The customers include Vayudoot, Indian Air Force, Coast Guard, National Airport Authority, U.B. and Indian Navy. Two aircraft, in maritime surveillance version, have been exported to Mauritius and one has been supplied to Govt. of Seychelles.

Other advantages of HAL-DO 228

Low fuel consumption and maintenance cost are characteristic features of DO-228. Other features like short take-off and landing capabilities, operation from semi prepared runway, comfortable air-conditioned cabin and long range make the aircraft very versatile. DO-228 can easily take off and land from all airports in the country at full capacity (19 passengers). HAL being the manufacturer of airframe, engines and accessories guarantees total product support for entire operating life.

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