

THE AIR ERA

₹40

Initiate, innovate and internalize!!



**INDIA'S ACE TEST PILOT,
WG.CDR. P. ASHOKA**



Agragami Applied Aeronautics is the perfect place for the students of all kinds of diversity who really want to pursue a keen knowledge about flying vehicles and unmanned systems. We really respect those students who have the potential to do something for the society and country through the advancement of science and technology. We invite them to do work with us and let's promote the technology through inspiration and innovation.

Apart from these the courses and facilities we provide will give you an exposure to get into various Aerospace companies in India as well as in abroad. All software companies in India are now putting their hands into aerospace field, which is really creating lots of job opportunity for the students of today's generation. If you really have the motivation inside yourself to do work for Aerospace Industries then come to Agragami Applied Aeronautics which will make you ready to face the real world situations.



AGRAGAMI VSM AEROSPACE,
C.A. No.14 & 15/1-A, 13th A Main, Sector 'A'
Yelahanka, New Town
Bangalore, 560 166.

vsm.modelaeronautics@gmail.com
+91-76768 25864
+91-88677 78910
+91-80953 40246

www.agragami.amritas.in



www.agragami.amritas.in +91-76768 25864 vsm.modelaeronautics@gmail.com

Agragami Applied Aeronautics

is a branch of Agragami Group of Institutions. This separate department for providing Aerospace services and its solutions. This department is fully dedicated to the students who are interested in UAVs and small flying objects including fixed wing aircrafts and multi-copters. It is the one and only RC Institute for time in India which provides the students on campus flying training, workshop and internships facility. Students can come, stay and pursue their knowledge in various programs from well experienced professionals.



Aerial Photography

We provide an unique experience to the customers to obtain high quality imaging of terrains, crop, water land and forestry estimation etc.



Air shows

We have brought an opportunity for you to have a real flight show in front of your sight. You will get an actual combat field experience along with lots of fun and starts.



Internship & Training

- Fixed Wing UAV/MAV
- Rotary Wing UAV/MAV
- UAV Propulsion Systems



Workshop

- RC Aircraft
- RC Quad copter
- Glider



Flying Training

- Fixed wing (Electric / Engine plane)
- Rotorcraft (Quad copter/Tri copter/ Hexa Copter)
- FPV Flying



R&D:

Agragami Applied Aeronautics has its own facility and establishment for doing research and development of high grade UAVs which are capable of accomplishing real world goals and mission. Agragami Applied Aeronautics aims to create a platform for the students and youngsters to develop unmanned systems that can be used for civilian as well as defence purpose.

What we Offer

Name of Course	No. of students in one batch	Duration	Fee structure (per batch) (In Indian Rupee)
Workshops			
RC Aircraft	4	2 days	6000/-
RC Quad copter	4	2 days	8000/-
Glider	4	1 day	2000/-
Internship & Training			
Fixed Wing UAV	3	7 days	12000/-
Rotary Wing UAV	3	7 days	18000/-
UAV Propulsion Systems	3	7 days	9000/-
Flying Training			
Fixed Wing	4	8 - 10 days	15000/-
Rotary Wing	4	8 - 10 days	20000/-
FPV Flying	4	12 - 15 days	25000/-

Contents

EVENT 06

AERO INDIA 2015

TECHNOLOGY ZONE 10

THE SUNSHINE FLYING MACHINE

Air Cmde Sajjad Rahim VSM (Retd.)

AVIATION PERSONALITY 12

**INDIA'S ACE TEST PILOT,
WG.CDR. P. ASHOKA VM & BAR (RETD.)**

DR.M.S.Rajamurthy

APPLICATION 19

Mini Unmanned Aerial Vehicles for
**AGRICULTURE AND AQUA-CULTURE:
Challenges Ahead**

Dr. K. Ramachandra

HOBBY 22

Smile **METAL BIRD-** You are on camera!!

Sanjay Simha

INDUSTRY 26

EDS TECHNOLOGIES

Mr. K.V. Ravikumar

INSTITUTIONS 28

**YOUR GATEWAY TO A
WORLD OF OPPORTUNITIES**

MVJ College of Engineering



Initiate, innovate and internalize!!

Editor in-Chief:

Joffin Jose

Managing Editor:

Ison. N.

Consulting Editor

AV Balakrishnan

Associate Editors

Darshan R.

Advisory Board:

Dr. M.S. Rajamurthy sc-G (Retd.)

CSIR - NAL

Air Cmde Sajjad Rahim VSM (Retd.)

Director (Academics)

Hidustan Aviation Academy

Dr. K. Ramachandra

CEO, NP-MICAVs: NDRF

K.V. Srinivasan sc-G (Retd.)

ADE

Wg Cdr D.P. Shabarwal

Hidustan Aviation Academy

K.V. Ravikumar

National Manager, EDS Technologies Pvt.Ltd.

Advertisement:

Display Advertisement

+91 9972212950

theaireramagazine@gmail.com

Classified

+91 9538107417

theaireramagazine@gmail.com

Recruitment Display

+91 9538107417

theaireramagazine@gmail.com

Subscription

+91 9538107417

theaireramagazine@gmail.com

Contact:

C 25/2, DRDO Township

C.V. Raman Nagar, Bangalore 93

Ph: 9844483483, 9538107417

E-mail: theaireramagazine@gmail.com

Cover page courtesy: Sanjay Simha



EDITORIAL

Dear reader,

You are holding a new issue of the Air Era magazine, a first of its kind aviation magazine aimed at acting as a media for all aviation related activities as well as to enlighten students and aviation enthusiasts with the latest trends.

It is our endeavor to bring out stories of our own heroes who have contributed to the Indian Aviation as well as the local industries and R & D institutions.

In this issue, we have an article on ACE test pilot, WG.CDR. P. Ashoka VM & Bar (retd.). His career spanning around six decades is an inspiration to younger aspirants to take Indian Aviation to greater heights. This Edition also covers insights into the highlights of the Air show 2015.

We urge you to support us in our endeavor by following every edition of our magazine and providing us with constant feedback and help us to fill the void of an Indian aviation magazine aimed at the student community and the general aviation enthusiasts.

Joffin Jose

AIRBUS DEBUT ALL-ELECTRIC AIRCRAFT PROTOTYPE at the Paris Airshow



During this year's Paris Air Show, Airbus unveiled an all-electric prototype airplane, called E-Fan 2.0. Claimed to be a "plug-in" plane, this carbon fiber composite plane with an empty weight of 1100lbs and a wingspan of 31 feet can be airborne for an hour. It wing houses 120 lithium-ion polymer batteries, which power twin 30kw engines that are

capable of flight speeds up to 136 miles per hour. The two-seater plane is nearly silent and has zero CO2 emissions. Even though this is not a commercial plane that could take you anywhere serious, it clearly shows Airbus' intent on completely switching to

renewable energy. A four-seater E-Fan 4.0 is also in the works and it scheduled for production by 2019.

The company says it wants to have a 100-seat electric passenger plane by 2050, and the E-Fan technology is currently being used by Airbus to build electric aircraft training models for flight schools.

HAL Completes Hot Weather Flight Trials of LCH

HAL's indigenously designed and developed Light Combat Helicopter (LCH) attained a milestone by successfully completing the hot weather flight trials for a nearly one week at Jodhpur recently. "Test flights were carried out in the temperature range of 39 to 42 degree Celsius. These were done with the involvement of customer pilots from Indian Air Force and Army in presence of representatives from RCMA and DGAQA", says Mr. T. Suvarana Raju, CMD, HAL.

LCH prototype, TD-3 was ferried from Bengaluru to Jodhpur to achieve the successful trials. The flight testing covered 'temperature survey of engine bay and hydraulic system', 'assessment of performance', 'handling qualities and loads' at different 'all up weights', 'low speed handling' and 'height-velocity diagram establishment'.

LCH had completed cold weather flight testing at Leh in February 2015. Two LCH – one on static and another on flying display-



enthralled people at Aero India 2015 held in Bengaluru earlier this year. The LCH is expected to receive Initial Operational Clearance and enter into series production by the end of this year.

About Light Combat Helicopter (LCH): The

CHANDRAYAAN-2 planned to be launch during 2017-18



The Chandrayaan-2, India's second mission to the Moon, has Orbiter, Lander and Rover configuration. It is planned to be launched during 2017- 2018 timeframe by Geosynchronous Satellite Launch Vehicle (GSLV) from Satish Dhawan Space Centre, Sriharikota.

This information was given by MoS in the Prime Minister's Office and Minister of State in the Ministry of Personnel, PG & Pensions, Dr Jitendra Singh said in Rajya Sabha.

Light Combat Helicopter is a twin- engine, dedicated combat helicopter of 5.8-ton class designed and developed by HAL to meet the requirements of Indian defence forces. The helicopter is designed to carry out dedicated combat roles such as Air Defence, anti-tank, scout and support combat search /rescue missions.

The indigenously design of the helicopter incorporates advanced technology features for facilitating combat operations and includes a narrow fuselage with tandem seating configuration for Pilot and Co-pilot / Weapon system operator (WSO). It incorporates a number of stealth features such as reduced visual, aural, radar and infra-red signatures and crashworthy landing gear, armour protection for better survivability. The helicopter is powered by two Shakti engines.

AERO INDIA 2015

CAPTIVATING THE INDIAN SKIES !

The 10th edition of Aero India was held from 18th to 22nd February 2015. Aero India has already carved a niche for itself globally as a premier aerospace exhibition, with nine successful editions organized between 1996 and 2013. The tenth edition of Aero India which was held at Air Force Station, Yelahanka, Bangalore was inaugurated by the Prime Minister of India Mr Narendra Modi. The theme of the 2015 Aero India was “Make In India” which was highlighted in his message that followed the inauguration.

The Prime Minister’s address highlighted that its easier for Public, private and foreign investors to manufacture defence equipment in India after the reform of the defense procurement policies and procedure. He also mentioned the simplification



Joffin Jose with the pilot from the Yakovlevs. The Yakovlevs stole the lime light at the airshow 2015 with their grace and breath taking manoeuvres.

of offset procedures and mentioned the need to have strategic partnerships rather than buyer seller relationships. The Small and Medium scale industries were meant to benefit from being part of global supply chain by providing cost effective engineering solutions to global players. He also stressed the need to export equipment and also to ensure that it dont fall into the wrong hands. There is a requirement of one million skilled workers in the Aerospace industry in India in the next 10 years. The aim is to ensure that 70 percent of the defense equipment are made within the country in the next five years from the current 40 percent. This can create large number of jobs. Prime Minister Modi said that “A strong Indian defence industry will not only make India more secure, but also make India more prosperous”.



A total of 72 aircraft were part of the air show. The main attraction of the event was the fly past and demonstration by HAL Tejas, HAL Light Combat Helicopter, Sarang display team and air display teams from Sweden, UK, Czech Republic and Open sky jump by US Special Forces. A total of 11 foreign military aircraft on display, were majority of them from the United States including two F-15C Eagles, two F-16C Fighting Falcons, one Boeing KC-135 tanker, one C-17 Globemaster III and a P-8A Poseidon maritime surveillance aircraft.

The Air Era team was one of the many media partners covering the event. The Air Era Team approached the Aero India 2015 with an aim to extract inputs from the various exhibits, experts as well as performers from the show. The Air Era team was privileged to interview the UK based aerobatic team Yakovlevz, F-16C Fighting Falcons Pilot and introduce the magazine to The Bretling Wing Walkers.

A few snippets are given below and you can catch up with the rest of the interviews in the official website www.theairera.com

The Yakovlevs are a UK based six-aircraft formation and aerobatic display team who have earned a reputation for excellence over the last 14 years, delighting over a billion people in the process, across four continents. In 2012 the team broke China Central Television (CCTV) viewing figures, attracting more than 380 million spectators over a five-day period when they were displaying at Faku on the North Korean border for the first ever AOPA China Airday. Consummate believers in pushing the boundaries of high performance, The Yakovlevs exude the highest standards in every aspect of their operation. The team is

a specialist airborne display team flying authentic cold war Russian war-bird aircraft in precise, yet graceful combinations of tight formations and exciting aerobatics, high speed passes and breath-taking crosses.

Q. What's the difference between normal flying and formation flying. The challenges faced during formation flying.

I think the most important thing is that you need to be able to fly an aircraft before you can do formation. Then it's the discipline. It's like any discipline. If you want to learn to dance, you want to learn ball room dancing or disco dancing or Latin American dancing, it's just a different genre. And formation flying takes



John. N. J with the Bretling wing walkers- the only wing walking team in the world they had the on-lookers gasping with their amazing stunts.



a lot of dedication and lot of mental understanding. You just work hard and trust the people around.

Q. Talking about trust, how do you communicate while in flight

Well we have been doing it for seventeen years and the pilots we know very well. There are hand signals we do a lot of because we are very close, it's just like a few feet away. They can see my hand, like when I am flying I show my hand, so when I am flying I can show 2, touch my head, touch my forehead, actually they are all signals .

There has to be a lot of trust. We fly a lot together and we know each other very well. So we know what's going to be next. When you fly with someone for very long, it's a lot easier.

Q. How do you maintain the precision while in formation flying

It's practise. We practise an awful lot. We just came back from China. We were in China twice and we were seen by 400 million people and we were flying every day. So it's like anything you do every single day. We work hard and we practise and sometimes it goes wrong a bit and today the no 2 had a bit of problem and eased out and came back in. probably just practise and practise and practise some more. And when we had some practise, we practise some more. Have you enjoyed the show??



Yes it was one of the finest displays by aerobatic teams in Bangalore airshow yet. Hoping to see much more of your team in the coming years. The sequence with the heart is quite extra ordinary.

Yea, we do the heart. We call that the Bangalore heart. We put it in for Bangalore. It is such a nice place and we love it.

Q. How challenging is the weather when coming into Bangalore.

For some one who is working in the aeronautical engineering like yourself, you can imagine a piston engine aircraft with this heat and this altitude, we have a density altitude which is equivalent to 6000 ft which is like flying at 6000 ft. so when we pull into a loop or a barrel roll we top out

at 7500+. The engines are working incredibly hard and it's incredibly hot. In the cockpit its around 36 degrees. So the pilots are getting very very hot as well. That the only bad thing of Bangalore i.e. it's so hot. When we arrived here, we got off the aircraft and we saw the engines still going .we told it can't be like that. We must have over heated the engines. We have come from Bristol where it's around 4 degrees and one of our pilots came from Washington where it was -7 degrees. And when he came out, he was like "goodness me".

Aero India 2015 will provide a significant platform in bolstering business opportunities in the international aviation sector. It is favourably poised an exponential



Joffin Jose with the flight test pilot from the U.S air force F-16 Demo team. The air era team had an exclusive interview with the F-16 demo team and insights about piloting a supersonic aircraft as well as the engineering aspects was shared exclusively for the air era magazine.

growth over previous edition. A rapidly growing economy, defence preparedness challenges and opening up of defence production to private sector, have given a major fillip to the defence industry in India. It has also become a hub centre for defence business in the Asia region.



The Breitling wingwalkers

The Breitling Wingwalkers bring a taste of retro glamour and colourful showmanship to the skies at events across Europe and beyond. As the world's only aerobatic formation display team to feature professional wingwalkers, the team has been entertaining airshow crowds for almost three decades. With their unique combination of skill, aerial artistry and effective teamwork, the formation of planes evokes the flamboyant and colourful character of aviation's golden era. Flying a fleet of four iconic Boeing Stearman biplanes the aerial ballerinas on the wing capture the carefree and colourful spirit

of aviation. But in contrast to the visual spectacle, the sound of the 450hp radial engines also catches the attention of those watching and creates a display that stimulates the senses for people

of all ages, making the team a family favourite at every airshow. The precision and skill demonstrated in the air is undertaken with absolute professionalism. The experienced pilots are among the most skilled in the world, with thousands of hours of experience to call upon flying a host of different aircraft in their careers. Flying at comparatively low speeds of around 100mph in the cruise, the pilots require not only superior handling skills but also an understanding of the aeroplanes themselves, which date back to the late 1930s.

SPECTACULAR

GYMNASTICS



WINGWALKING POSITIONS



1. HANDSTAND

Swivel the rig round 180 degrees. It takes a lot of 'oomph' to swivel against the wind! The rig stops at this 180-degree position, it won't swivel round any further - but it takes practice to stop it swivelling back down in the wind and turbulence.



2. SIDEWAYS

Swivel the rig round 90 degrees. A straight leg is parallel with the wing while the other is bent with the toe to the knee of the straight leg. Both feet pointed. The lower arm is straight with the hand holding the wire on the plane - to stop the rig swivelling in the wind and to maintain the nice shape. Elegantly wave at the crowds with the arm.



3. BASIC STANDING

Bend the right knee to achieve an elegant looking stance - rather than just standing there! When waving at the crowd, it is actually a big wide movement of the arms - straight arms where possible. Big movements are obviously better as easier to see from the ground. Holding a simple position is difficult against a 120mph wind.



4. WINDRIDER PASS

First manoeuvre after unstrapping from the rig. Force right leg out and over the leading edge of wing. Wrap leg over leading edge of top wing. Left leg is stretched out towards the back of the plane with the back foot hooked in the handhold. Toes pointed! Back arm supports upper body and helps push against wind. Other arm is stretched forward.



5. COCKPIT LADY

This manoeuvre is particularly fun for the girls as they are out of the rig and climbing freely (attached by a waist harness, safety wire). It is hard to achieve at first and requires strength good balance and stamina. The arabesque pass is the last pass with the girls out of the cockpit, after this pass they climb down and strap themselves into the seat.



Air Cmde Sajjad Rahim VSM (Retd.)
Hindustan Aviation Academy, Director (Academics)

THE SUNSHINE FLYING MACHINE

The objective: To give a powerful message to the world that clean technologies, renewable energies, pioneering spirit and innovation can achieve the impossible. It comes from Swiss explorers Bertrand Piccard, a psychiatrist & astronaut and Andre Borschberg a former fighter pilot & a business man. They are the founders and driving force behind Solar Impulse, the first aeroplane with perpetual endurance to fly day and night without a drop of fuel.

Piccard was part of the first team to circumnavigate the earth non-stop in a balloon in 1999 and has pioneering blood in him, his grandfather was the first man in stratosphere and his father was the first man to touch the bottom of the Mariana trench. Both piloted the earlier version of Solar Impulse across U.S. in 2013.

The Project: Bertrand Piccard initiated the Solar Impulse project in November 2003 after undertaking a feasibility study in partnership with the Ecole Polytechnique Fédérale de Lausanne. By 2009, he had assembled a multi-disciplinary team of 50 engineers and

technical specialists from six countries, assisted by about 100 outside advisers and 80 technological partners. The project is financed by a number of private companies and individuals, as well as receiving around CHF6 million (US\$ 6.4 million) in funding from the Swiss government. The first company to officially support the project was Semper Gestion, after its co-founder Eric Freymond was convinced of the future success of Piccard. The project's primary partners are Omega SA, Solvay, Schindler and ABB. Other partners and supporters of the project include Bayer Material Science, Altran, Swisscom, Swiss Re (Corporate Solutions), Clarins, Toyota, BKW FMB Energie and Symphony Technology Group. The EPFL, the European Space Agency (ESA) and Dassault have provided additional technical expertise, while Sun Power provided the aircraft's photovoltaic cells. In October 2013, Peter Diamandis, founder of the X Prize Foundation, had become a supporter of the project after meeting with Solar Impulse officials during 2013 Zeitgeist event

The Prototype, Solar Impulse1:

The prototype aircraft, bearing the Swiss aircraft registration code HB-SIA and often referred to as Solar Impulse 1, was primarily designed as a demonstration aircraft, is a single-seat monoplane. It has a non-pressurized cockpit and a single wing with a wingspan 63.4 m similar to that of the Airbus A340 airliner. To keep the wing as light as possible, a customised carbon fibre honeycomb sandwich structure was used. The HB-SIA is capable of taking off under its own power. Under the wing are four nacelles, each with a set of lithium polymer batteries, a 10 hp (7.5 kW) electric motor and one twin-bladed propeller powered by photovoltaic cells. 11,628 photovoltaic cells on the upper wing surface and the horizontal stabilizer generate electricity during the day to power the electric motor and to charge the batteries allowing flight at night. It is designed to remain airborne up to 36 hours. The aircraft conducted its first test flight in December 2009. The aircraft's major design constraint is the capacity of the lithium polymer

batteries. Over an optimum 24-hour cycle, the motors can deliver a combined average of about 8 hp (6 kW), roughly the power used by the Wright brothers' Flyer. In addition to the charge stored in its batteries, the aircraft uses the potential energy of height gained during the day to power its night flights

The First Flight: On 8 July 2010, the HB-SIA achieved the world's first manned 26-hour solar-powered flight. The airplane was flown by André Borschberg, and took off at 6:51 a.m. Central European Summer Time on 7 July from Payerne Air Base, Switzerland. It returned for a landing the following morning at 9:00 a.m. local time. During the flight, the plane reached a maximum altitude of 8,700 m (28,500 ft). At the time, the flight was the longest and highest ever flown by a manned solar-powered aircraft;

Solar Impulse2: Improving on the prototype, a slightly larger design was created in 2014, designated HB-SIB and named Solar Impulse 2. Solar Impulse HB-SIB required the development of new materials and new construction methods. Solvay invented electrolytes that allowed the energy density of the batteries to be increased; Bayer Material Science allowed the project to make use of its nano-technologies allowing use of carbon fibres that are lighter in weight than any previously known. S12 has wing span of 72.3 m (as wide as Airbus A380), length-22.4 m, weight-2300kg, 17000 solar cells (135 micron thick) over 270 sqm of wing and fuselage and supply four electric motors (17.5 hp each) with renewable energy. During the day, the solar cells recharge lithium polymer batteries weighing 633 Kg which allow the aircraft to fly day and night, average speed 70 kph and max altitude 8500 m. The cabin is not pressurised and heated, though the outside temperatures can reach -40 deg C. The aeroplane does not have an auto pilot but an electronic co-pilot which can help the aeroplane



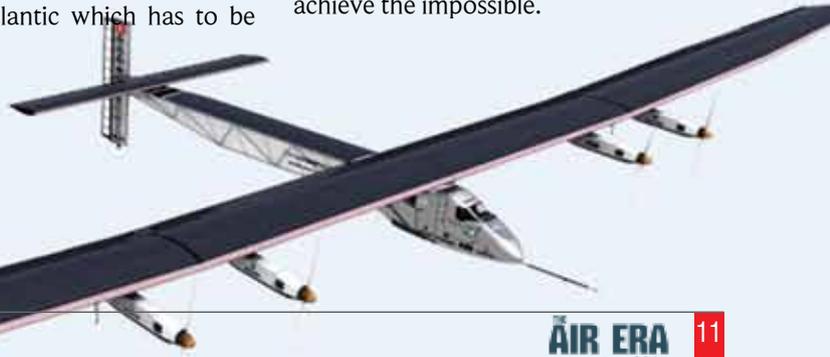
to hold course, when the pilot is resting. The seat doubles as a toilet seat when a flap opens in it.

Round the World on Sunshine Wings: The mission to fly round the world without a drop of fuel. The round the world flight started from Abu Dhabi on 09 March 2015. The route includes stops over Oman, India, Myanmar and China. It has already gone as far as China. After flying across the Pacific Ocean via Hawaii, S12 will fly across the USA and over the Atlantic Ocean, heading back to Abu Dhabi in July 2015. The mission control is located in Monaco where the weathermen, air traffic controllers and engineers are stationed.

65 ground crew travel with the aircraft. This being a single seat aeroplane the two pilots take turn to fly one leg each, the other pilot meets the flight at the next stop and takes over the controls. The maximum time one pilot spends in the air at a stretch is five days; this is how long the plane takes to cross the Atlantic. This means the pilot has to eat, sleep, drink and use toilet in the cramped cockpit. It demands physical and mental strength, the pilots have undergone intensive training, including yoga and self hypnosis to fly over 3 continents and two oceans covering a distance of 35000 km. particularly the leg over Atlantic which has to be

flown continuously for 5 days and the conditions have to be absolutely right. The pilot sleeps only over the oceans for safety reasons, for maximum of 20 minutes. If something goes wrong the pilot can bail out and use ocean survival gear to be rescued. At 2300 kg, about the same as an SUV the aeroplane needs perfect weather conditions, including cross winds of less than 7 km/h in order to fly. The preparatory measures are therefore challenging for weather specialists and engineers at the control centre as much as for the pilots. All possible trajectories and strategies were simulated from defining the pit-stops at the airports along the route, to different speeds, altitudes and holding patterns. The aeroplane takes off and lands at early mornings/night to avoid turbulence. The aeroplane takes off at a speed of 35 kmph, during day it climbs to 27800 ft, stores solar energy, picks up top speed of 160 kmph, at night descends to 5000ft, slows down to save power and reduces pilot stress.

The mission is important not only from the technical and operational perspective but the test of human endurance, physical and mental strength. It sends powerful message to the world that clean technologies, renewable energies, pioneering spirit and innovation can achieve the impossible.





INDIA'S ACE TEST PILOT, WG.CDR. P. ASHOKA VM & BAR (RETD.)

Great German aviation pioneer Otto Lilienthal said - "To invent an airplane is nothing. To build one is something. But to fly is everything." Flying an airplane demands skill and discipline, more so if it is a new invention. In the earlier days of aviation, the inventors themselves were the pilots, be it Otto Lilienthal, the Wright Brothers or Bleriot. As the airplane designs evolved and became complex, a new breed of pilots emerged, who took the daunting and daring task of flying new airplanes. They are called test pilots who play a crucial role in the development of airplanes.

Test pilots are part of airplane development process and they walk along with the design team till the airplane is test flown and gets certified

for airworthiness. They continue with the airplane production as well, as every airplane has to be test flown before handing over to the customer. There are prestigious Test Pilot schools to train these unique pilots. The first ever such school- Empire Test Pilot School (ETPS) was established in UK in 1943. There are a handful of such schools across the globe. We have our own test pilot school, Aircraft and Systems Testing Establishment (ASTE) of the Indian Air Force, in Bengaluru, which trains test pilots and flight test engineers.

Wg.Cdr.P.Ashoka (retd.) is an ace test pilot of India with five decades of professional flying. Over four decades of this was in test flying various airplanes that glorified the Indian



Wg.Cdr.Ashoka with Vampire

skies and he has made a name in the international arena of flight testing.

Late Air Marshal M.S.D.Wollen (retd.), called Wg.Cdr.P.Ashoka (retd.), the finest test pilot of India and ranked him along great test pilots of yesteryears - Bill Bedford of UK; Robert Hoover of USA and Aleksandr Fedotov of Russia. This is an extra-ordinary compliment, from an accomplished fighter pilot and under whom Wg.Cdr.Ashoka started his test flying career. Bill Bedford was a Hawker test pilot associated with development of VSTOL airplanes and was the first pilot to fly the Hawker P.1127, Kestrel, and Harrier. Robert Hoover referred as Pilot's Pilot, was a USAF test pilot who revolutionized modern aerobatic flying. A.Fedotov was the test pilot with the Mikoyan EDB, and was associated with flight testing the MiG family of fighter planes from MiG-21, 23, 25, 27, 29 to MiG 31.

It is heartening to note that Wg.Cdr. Ashoka has a part of each of these great test pilots' accomplishments. He contributed to many airplane development programs in India, was known for his aerobatic skills on all the airplanes he flew and was associated with MiG21 and other MiG airplanes' flight testing for nearly a decade.



L to R: Flt.Lt. P. Ashoka, Flt. Lt. Satwant Singh, Wg. Cdr. MSD Wollen, Flt. Lt. V.K. Singh

Test flying of airplanes demands physiological and psychological fitness of highest level. While most senior fighter pilots ease off from active flying in their early forties, Wg.Cdr.P.Ashoka continued test flying high performance airplanes till his retirement from service at the age of 58, which is a great accomplishment even by international standards. He has to his credit 8000 hours of flying and has flown over one hundred airplanes. Wg.Cdr.Ashoka has won many international awards in his career making his presence felt in the international test flying fraternity.

Wg.Cdr.P.Ashoka's career can be divided into three distinct phases, first

with the Indian Air Force, next with Hindustan Aeronautics Ltd., and finally with National Aerospace Laboratories. Each phase, saw a distinct contribution by him.

Wg.Cdr.P.Ashoka was born on Oct.13,1934 at Indore, Madhya Pradesh. In 1950, after completing first year Intermediate, he joined National Defense Academy(NDA) at Dehra Dhun. Soon after his graduation on Jun.2 1952, he was sent to Air Force Academy at Begumpet, Hyderabad for flying training. He had his first solo flight on Nov.28, 1952, on a Tiger Moth. After his second stage of flying training on Harvard airplane, in Jan.1954, he was



Receiving the Edwards award & Hunter Trophy



Receiving Vayu sena medal from Air Marshal Arjan Singh



Wg Cdr P. Ashoka briefs the Secretary to the Ministry of Civil Aviation, Mr K. Roy Paul at the handing over of three new Hansa airplane in Bangalore on 22.Mar.2002. [© Deccan Herald]

commissioned as a fighter pilot in IAF. On completion of conversion training on Vampire fighter he was posted to No.1 Tiger squadron at Palam.

In 1956, he was selected for the Flying Instructors' course at AF, Tambaram. But, he had to leave in the middle as he was one of the first ten pilots selected for conversion flying on Mystere IVA, in France. On his return, he was posted to the first Mystere IV squadron. On his return from France in March 1957, he was posted to the Airplane Erection Unit in Bombay where the semi-knocked

down Mystere airplanes shipped from France were assembled and his role was to flight test these airplanes. This could be reckoned as the beginning of his test flying career.

In Jan. 1960, he joined the three pilot team headed by Sqn.Ldr. MSD Wollen which formed the Gnat handling flight as a part of Aircraft and Armament Testing Unit (later ASTE) and carried out detailed service evaluation trials of Gnat Mk1 airplane during Jan.1960-June 1961. Subsequently, he was part of the first Gnat Mk1 squadron of IAF.



Getting ready for the last flight.

In 1963, he was selected to undergo test pilot training at the prestigious Empire Test Pilot School (ETPS) at Farnborough.UK. He completed the training with flying colors, winning Edwards award for the Best progress and the Hawker Hunter Trophy for the best preview during the course. During Jan-June 1964, he participated in the development flight testing of VC-10 with British Airplane Corporation, UK.

On his return from UK in Sept.1964, he was posted as test pilot to No.1 Base Repair Depot (BRD) Air Force Kanpur. The same year he received the commendation from Chief of Air staff. For the next two years, he carried out production test flying of a number of airplane, which included Harvard, Vampire, Toofani, Mystere IV and Hunters.

During 1966-68, posted at A&ATU, Kanpur, he carried service evaluation and developmental flight trials on HF-24 and HJT-16. During 1968-75, on deputation to HAL, Kanpur as Chief Test Pilot, he carried out production and developmental flight trials on HS-748 and flight trials on MiG-21M and Su-7 airplane. In 1969, he received the Vayu Sena Medal followed by bar to Vayu Sena Medal in 1974.

In 1975, he moved to HAL Nasik as Chief Test Pilot (CTP) and carried out flight testing of MiG21. In Jan.1976, Ashoka retired from IAF and got permanently absorbed in HAL. This was completion of the first phase and beginning of the second phase of his career.

From Jan.1976 to 1983, as the CTP of HAL, Nasik he carried out extensive production flight tests on MiG21 variants and Su-7. Wg.Cdr.Ashoka's cordial disposition made him close to the design team at Nasik and he made contribution to development of brake



Wg.Cdr.Ashoka with MiG 21

sector for MiG 21. HAL Nasik was the first in the world to fly an operational MiG-21BIS airplane with vortex plate. Wg.Cdr.Ashoka made this possible. In 1978, he was deputed to Norton AFB, USA, for an International Flight Safety management Course. Wg.Cdr.Ashoka stood first among the participants from over 30 countries and won the Trojan award.

Apart from being the CTP at HAL Nasik, Wg.Cdr.Ashoka was assigned the responsibility of Additional General Manager, Overhaul. This was a boon to both the manufacturer and the user. He made tremendous contribution in improving the quality of overhaul. He would visit the operational MiG-21 squadrons and fly the problematic airplanes and advice maintenance actions and would follow up these from HAL, Nasik.

In 1983, he was posted to HAL Bangalore as CTP. Here, till his retirement in 1992, he carried out developmental test flights on number of airplanes which included spin trials on HPT32, HTT-34, Kiran

MKII and Ajeet Trainer; production tests on HT-2, Kiran MKI and II, Canberra, Packet, Jaguar, Chetak and Cheetah helicopters. In addition, he carried out test flying at HAL Nasik on MiG 21 and MiG 27 aircraft, and at HAL Kanpur on HPT-32 and Dornier Do-228. He carried out the first flight and initial flight testing of Light Canard Research Airplane (Rutan's LongEz) of NAL as well as evaluation flight of Swati prototype airplane of DGCA. In 1987,

he became Executive Director (Flight Operations & Safety) and concurrently CTP. He continued flying till his superannuation in Oct.1992.

Wg.Cdr.Ashoka made significant contribution to the LCA program. During the PDP phase, he was the chairman of the sub-committee on Handling Qualities criteria and was heading the LCA Test and safety team till his retirement. As the convener of the sub-committee on Handling



Wg.Cdr.Ashoka with MiG 27



Qualities criteria, I vividly remember the discussions I had with him on criteria proposed by RAE. He didn't want to get into the technical aspects and numbers. He asked me to explain in terms of pilot input and the response. When I explained it and response bounds stipulated by the criteria, he immediately said - yes that makes sense. He is a designers' test pilot and would meticulously guide them.

The third phase of Wg.Cdr.Ashoka's career started in 1993, first as Scientist Emeritus and later as consultant to National Aerospace Laboratories (NAL). Recollecting the invitation by Prof.R.Narasimha, the then director of NAL to join as Scientist Emeritus, Wg.Cdr.Ashoka says that he told Prof.R.Narasimha that he was not a scientist and he is a test pilot who can do mad things on the MiG. Prof.R.Narasimha's reply was that he will be called Scientist as there were no other titles available. This association of Wg.Cdr.Ashoka lasted for almost two decades during which he guided NAL through their airplane development programs. He was closely associated with the development of Hansa, flew all of them, played a pivotal role in its

certification and induction to the flying schools. Hansa was so close to him that he chose this bird for his last professional flight.

As NAL, moved on from Hansa to SARAS, he got involved with SARAS and was a guided the design team on all aspects related to SARAS testing. As Associate Project Director (SARAS Flight testing), I had one more opportunity of working with him. He was the flight test director for SARAS and guided us all through ground tests, taxi trials and test flights. He formed a nice bridge between us and ASTE, IAF which took the task of flight testing SARAS.

Wg.Cdr.Ashoka has an exceptional skill of flying fighter planes. His mastery of flying airplanes is well known. He has tamed them all, particularly the MiGs. Undercarriage retractions at very low levels, vertical climbs with snap rolls, steep turns and steep approaches are some of his favorite maneuvers. He could takeoff on his favorite MiG-21, retract the undercarriage at 3-4 ft, and maintain the same height till the end of runway and then climb vertically with rolls. He could fly at 1300 Km/h at treetop height. His flying skills were

put to spectacular use in Yash Chopra's blockbuster Silsila, where he was pitching for reel hero Shashi Kapoor. When Dr.K.Y.Narayan of NAL had gone to HAL, Kanpur for a meeting, he had an interesting experience. As they were in a meeting room, suddenly there was commotion outside and everyone in the room ran out. When he asked why, they replied: "look up, Ashoka is flying!" When I flew with him in the LCRA, we were over Hoskote, North-East of Bangalore, he said he will give a nice experience and soon we were flying low level and I could see the sheep and the shepherds run helter-skelter!

Test flying has its own challenges and risks. Wg.Cdr.Ashoka had his own share of testing moments. Unforgettable among these is the Gnat bailout. On Feb.24, 1960, while test flying a Gnat Mk.1, he entered into a spin at 46,000ft off a maneuver from which recovery was not possible. He ejected from the airplane at 12,000ft. That was the first successful bale-out from gnat in India. On Jan.24, 1980, during take-off in a MiG-21, due to a mechanical fault the braking chute streamed as he was about to get airborne. Ashoka realized it in an instant and jettisoned the chute

and continued the take-off. His single engine takeoff demonstrations of HS748 are well known. Wg.Cdr.Ashoka enjoyed performing the characteristic 'Wingover' in his pet plane NAL's Hansa.

On Nov.28, 2002, exactly 50 years after his first solo on a Tiger moth, he took to the sky in Hansa for the last professional flight. This great event was celebrated at NAL, where the staff, well wishers and his family were present. On Nov.30, 2002, HAL organized a felicitation function with its Chairman Mr.Mohanty honored him. On Dec.12, 2002, NAL honored Wg.Cdr.P.Ashoka with a Symposium on flight testing followed by a felicitation function. NAL presented him with a unique memento – a painting by Mr.K.S.Raman depicting five major incidents in his career. The accolades and compliments from his peers is a testimony to his achievement.

With fifty years of professional flying, mostly on jet fighters, following is what



Wg.Cdr.Ashoka with MiG 29

Wg.Cdr.Ashoka has to say about fighter and test pilots.

While anyone can learn to fly fighter flying and test flying require special aptitude that not everyone may have. A successful pilot must have the ability to fly accurately, to push the plane

to its limit, to stay cool even when things get difficult, to simultaneously concentrate on a number of things, giving attention to all the 'elements' in the right proportion ... but, most of all, a successful pilot must really love flying. Pilot's motivation depends on



Wg.Cdr.Ashoka with Jaguar

the degree of real joy that he gets from flying. Wg.Cdr.Ashoka enjoyed flying immensely, which is what kept him flying planes for half a century!

Fighter flying and test flying involve different risks, but probably of the same order. In the long run, test flying career may entail a higher level of risk. Fighter pilot needs raw courage in facing the enemy and other wartime challenges. Test pilot requires cool courage and equanimity to handle the risks that is constantly faced in the execution of test flying tasks. Test flying is all about bringing to bear your personality, judgment, sense of proportion and that all-important thread of reasonableness in your flying tasks - not to forget a calibrated aggression in flying.

Test pilot must have a personality which makes interaction with him easy and rewarding - at all levels. The test pilot's challenge lies in pushing the airplane to its limit legitimately - and not foolishly. A timid test pilot will not be able to explore the full capability of the airplane, while a reckless test pilot would push the airplane perilously beyond safe boundaries. A good test

pilot needs a judicious balance between the two. To succeed in either of the two roles one needs that certain intangible, but magical, quality called "dash". It is something not easy to define and yet easy to detect. The closest approximation could be "daring". To be a successful test or fighter pilot what is really needed - other than flying ability - is this quality called "dash", tempered with prudence.

No pilot, however talented or capable, can afford to turn complacent. Flying is a tough business, crash will bring death. Airplanes should never be taken for granted. While flying different types of airplane on a single day, one has to take time off to mentally get attuned to the different cockpits and other characteristics of different airplanes.

It is a great feeling that we have amidst us an ace test pilot who dedicated six decades of his life to the cause of Indian Aviation. This is our humble salute to him, who made a name to himself not only in India but also abroad. Air Era wishes him a happy, healthy and peaceful life.



DR.M.S.Rajamurthy

Scientist G (retd.) NAL

Dr. Rajamurthy was associated with many flight testing programs. During 1982-84, as a DAAD scholar he was involved in flight testing of Dornier-28D1 Skyservant aircraft of Tech. University of Braunschweig. West Germany. During 1985-86, he was associated with the instrumentation and flight test plan for LCRA. During 2000-2005, as Associate Project Director (SARAS Flight testing), he was responsible for flight test instrumentation, test plans and test data analysis of SARAS prototype aircraft.



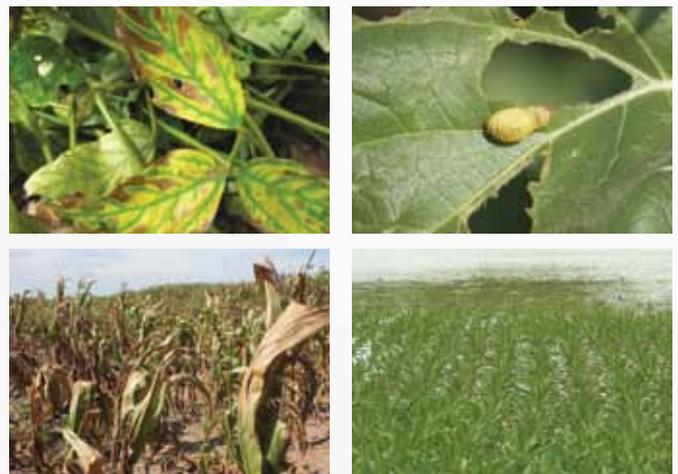
With his family – his wife, son, daughter-in-law and grand sons

Mini Unmanned Aerial Vehicles for AGRICULTURE And AQUA-CULTURE: Challenges Ahead

Development effort on Unmanned Aerial Vehicles has leap-frogged globally for both Civil and Defence applications and this trend is not different in our Country as seen by the mushrooming number of “Start-ups” in this field. Though we are lagging behind the technology readiness levels with reference to global benchmarks, the National Program on Micro Air Vehicles is an indication of the challenges that we are trying to face and reduce this technology gap. This program is focused on Micro and Nano vehicles of Fixed Wing, Rotary Wing and Flapping Wing configurations, Entomopters, as well as Cyborgs which integrate Biology and Engineering disciplines and is aimed at Disaster Management, Homeland Security and e-Governance. There is however a large predicted demand for mini aerial vehicles which have a high potential for applications in agriculture and aquaculture.

Our traditional agricultural processes and climatic environment result in several challenges related to irrigation, soil condition, insects, rodents and crop diseases, a few of which are highlighted in (Figure 1). For more efficient micro-farming processes, prevention of losses and to increase productivity, the potential of mini aerial vehicles are being

increasingly leveraged and in our context, apart from the conventional aerial vehicles, two other major types of vehicles, Heavy Duty Multi-Rotor Aircraft and Aqua-copter have been identified as suitable vehicle systems and need huge developmental effort and operational experience.



(Figure 1).



Heavy Duty Multi-Rotor Aircraft

Multi-Rotor Aircraft especially Quadcopters are being extensively used in the Country for many Civilian and Defence applications and one of them, built by the Consortium of the National Design and Research Forum is shown in (Figure 2). This battery operated Quadcopter with a dimensional limit of 500 mm can easily fly around 100m altitude. This type of vehicle has a limited range, endurance and payload capability for any meaningful and sustainable agricultural application. Fixed Wing unmanned aircraft and Quadcopters of bigger capacity, Hexacopters and Octocopters are therefore the unavoidable choice for agricultural applications. A payload capacity of about 15-25kg, to carry a variety of devices such as normal and thermal-vision cameras, bird-hazing equipment, seed-sowing accessories and fertilizer / pesticide spraying systems, with an endurance of around 45-60 minutes, are invariably the basic prerequisites for successful deployment of unmanned aerial vehicles for agriculture (Figure 3).



(Figure 3)



(Figure 2).

These need to be developed into viable stable platforms to handle activities such as monitoring crop and soil condition, irrigation levels and spraying of pesticides and fertilizers for not necessarily short height crops like wheat but also for mango, coconut trees etc., which is also a major concern in agricultural productivity. The challenges posed by the higher payloads and endurance for rotary wing vehicle is the size of the propellers, associated aerodynamics and power supply. Associated with this large size high speed propellers is the safety of the personnel and the equipment itself. This warrants ductings around the propellers which will not only increase the propeller efficiency but also provide additional safety. A large number of configuration-optimization programs and development testing is involved in realizing stable and reliable platforms with Quad rotors. This vehicle still has however the disadvantage of loss of stability in case even one of the propellers gets damaged or broken and the control of this type of vehicle is more complex due to the forces of spray bars and spray nozzles (Figure 4).



(Figure 4).

From the point of view of stability, payload capacity, range and endurance Hexacopters with six propellers and Octocopters with eight propellers seem to be the most viable options. Another variant of this is the Quadcopter configuration with contra-rotating eight propellers (4x2) which will minimize the dimensional envelope of vehicle. This is a possible solution which limits the size of the vehicle but at the same time has the ability to carry more than 15 kg of payload, better stability, required range and endurance. A critical issue that needs to be studied with reference to this configuration is the cross influence of the two tandem contra-rotating rotors and a bigger size protective duct around the propellers (Figure 5).



(Figure 5)

Issues specific to fertilizer / pesticide spraying operations are the dynamic loads of spray bar / nozzle and minor sloshing effects in the fluid tanks of the system, interacting with the dynamic propeller thrust forces. Development of this agricultural system therefore needs more sophisticated control system, relatively larger segment of developmental testing and much bigger training program for farmers, service providers and maintenance personnel.

Aqua-copters

A large number of aqua-ponds support aqua-culture in the Country and is one of the major activities in coastal areas of Andhra Pradesh, Tamil Nadu, Karnataka and Kerala. Statistics indicate that aqua-culture is a high density short-term operation in coastal areas in which stakes and risks are very high. Aqua-culture includes cultivation of fish and prawns is highly dependent on environmental issues and the

quality of water,dictated by temperature, pH value, dissolved oxygen, nitrides, ammonia and turbidity of water system. These are understandably very sensitive to variation in weather conditions, wind and local variables.These need to be continuously monitored and corrected on almost day-to-day basis. In addition, fish and prawn need regulated feed quality and feed rates into the ecosystem.

Tracking and control of these parameters are presently manual and random, there is a big need for mechanizing these operations. A few improvements to the manual operations is by employing small boats which carry water sampling devices / sensors for monitoring water quality parameters. This process inspite of mechanized boats is slow and sluggish and is limited to smaller areas of operation. Deployment of modified Quadcopters for aquatic operations will make a tremendous change to the process of water quality monitoring and control.

This needs the development of flying vehicles which can land on calm water surface and sail for short distances and take-off from water surface of ponds.This is definitely possible with aqua-copters which are basically maritized version of quadcopters or other multi rotor aerial vehicles. While floating / sailing on water they can help in monitoring of water quality parameters through sensors, aqua compatible cameras and video systems for health and growth of fish and prawn in ponds which are not normally more than 2 to 3m in depth. Therefore this aquatic version of multi rotor systems become very viable option for monitoring quality of water, growth of fish / prawns and tracking possible diseasesassociated with aquatic animals. The usage of aqua-copter (Figure 6) therefore becomes important because they can move quickly to different parts of the ponds which are bigger than 10 to 15 acres in area.



(Figure 6)

They can easily be controlled from shore of the ponds and one can easily measure and coordinate the measurement points through autonomous and manual / remote control. These aqua-copters can also carry laser and acoustic systems for hazing birds and insects away from ponds and at the same time monitor water quality and health of fishing / prawns with attached camera systems.

Successful deployment of these two systems is expected to revolutionize agricultural and aqua-cultural operations, provided they are developed with required robustness and reliability. Aquisition and operating costs need to be reduced enough to make them affordable to farmers and service providers, and enable atleast a community farming paradigm in the sectors of agriculture and aqua-culture in the coastal areas of our Country.It is hoped that with these two technologies, Heavy Duty Multi-Rotor aerial vehicle and Aqua-copterbeing launched, it should not be very difficult to integrate them into a vibrant support system for agriculture and aqua-culture in the Country.



Dr. K. Ramachandra completed his B.E (Mech), M.E in Machine Design, Ph.D (Mech) and MBA in Financial Management. He has 33 years of Experience in R&D organisations and 7 years in teaching. He is a Chartered Engineer, a Fellow of The Institution of Engineers (India) and Former Director of Gas Turbine Research Establishment. He was Senate Member of VTU and is the Chairman of the Board of Studies in Aeronautics, President of Bird Strike Research Group of India and Indian Society of Networked Unmanned Systems. Currently, he is the Director of NDRF and CEO of NDRF-NPMICAV Projects.



SMILE

METAL BIRD- YOU ARE ON CAMERA!!

I feel aviation photography is similar to wildlife photography in many ways. In wildlife photography you have to be familiar with the habitat, temperament, likes, dislikes and other behavioural patterns of your subjects. It is the same for aviation photographers. The most important thing is the passion for the airplanes. The following are the tips for those who want to take up this passion.

When visiting an airfield on spotting trips, make sure you position yourself away from the clutter of ground vehicles

and other airport infrastructure. You wouldn't want a good picture to be spoiled by objects that you originally hadn't planned to shoot. Always remember, the aircraft should be the primary attention grabber for the viewer. Once inside the airfield, recon the area to understand the layout and terrain, identify a few locations which are ideal for photography and then set up the equipment. The sun also plays an important role in the locations I choose; ideally would prefer the sun being behind me, but that may not be sometimes

possible. Do not start taking pictures till you are satisfied with the location you have chosen. Familiarize yourself with the regulations and procedures that govern the specific airfield. This is to ensure compliance to flight safety and to also avoid capturing objects that may be sensitive. Similar process applies while spotting from outside an airfield; make sure you have the approval of the authorities though.

I use Nikon cameras, and an assortment of lenses ranging between 11mm to





400mm focal length. My kit also consists of a 1.4x teleconverter, tripod and a few additional batteries; if at all I have to use the TC, the light has to be good. Carry sufficient quantity of water and stay hydrated; standing continuously in the scorching sun will sap your energy levels quickly.

The camera settings vary, and depends mainly on...you guessed it right — lighting. However I keep adjusting various parameters during the shoot like, lower shutter speeds while capturing helicopters or propeller aircrafts to get the rotation or blur effect of the props/rotors; high shutter speeds if a fighter aircraft is doing low level flying or even for their take offs and landings; higher ISO with lower shutter in late evening lighting conditions; narrow aperture if subjects are scattered over a wider area or while doing night photography using a tripod. Exposure compensation critical to a picture, needs to be monitored periodically as the light changes if the subject is backlit or for any other reasons which your creative mind visualizes. I normally don't make use of the multiple-frame shooting

option since I am accustomed to clicking single frames and am very selective with the timing of my shots.

Night photography is also something that I enjoy doing. Aircrafts, be it commercial or military, have their unique beauty that is personified by their design and livery. The sky aided by background lights on the ground and soft moonshine, can sometimes add

an amazing dimension to the picture. For stationary airplanes, I set aperture to around f20, and shutter speed to anywhere between 30 sec to 2-min. The long exposures drain your battery power; so carry spare batteries that are fully charged and last the entire session.

Aerial photography presents its own challenges — the space inside the aircraft is a premium and with the harness secured, wearing a helmet



with headphones, it never is easy to turn your head towards the aircraft in formation. It is also important that you don't damage your equipment in the cramped seating, apart from interfering with flight controls, etc. As a thumb rule the VR is in active mode, and exposure compensation depends on the canopy's or window's perspex. Open windows or choppers with doors removed allow you to come in contact with the chill wind that is blowing. It is extremely important that your camera is slung across your shoulder correctly so that it doesn't get blown off.

I shoot images in Raw, so that corrections if any, can be made and also have the option of printing the picture to really big sizes. My editing experience being limited, I use Adobe Photoshop CS5 and Lightroom 5.3. Raw pictures are large files and need sufficient storage in the memory cards. I use both CF & SD cards that range between 16 to 64GB.

A good group that I have been associated with is **Aviation Photographers India** (<https://www.facebook.com/groups/avphoto/>). I recommend interested people taking up a membership with them...the opportunities that come



your way to take pictures in civil airports is amazing, as also the pleasure of rubbing shoulders and learning from some of the best photographers in the industry is unparalleled!!

Thanks to aviation photography, I have had the opportunity to travel to areas where common man is otherwise not allowed. Apart from IAF bases & civil airports, I have also covered a few foreign air arms as well as those of the Indian Army and Navy too. As an extension of my passion for the armed forces, I now have begun covering

warships and battle tanks as well.

Staying curious helps you to excel, but give it your commitment and give it time. Have patience...on and off the airfield!! Photography after all, is playing with the light, and airplanes are man's technological marvel. Combining both to your advantage is the key!!



Sanjay Simha

Sanjay Simha is a first generation entrepreneur from about two decades. When he has time from his Logistics and BPO businesses, he travels around the world chasing his passion – Aeroplanes & Aviation Photography. He also has a museum in his home with a display of about 300 scaled aero-models.

THE AIR ERA



WRIGHT FLYER 1905



BLERIOT



JUNKERS-JU 52



DC-3 DAKOTA



SUPER CONSTELLATION



DE HAVILLAND COMET



BOEING 707



CONCORDE



AIRBUS 320



AIRBUS 380

THE AIR ERA

E-mail: theaireramagazine@gmail.com

Please accept my Subscription of **THE AIR ERA**

Name _____

Address _____

Ph: No _____ E-mail _____

Payment Cash Cheque Cheque /DD No. _____

Drawn on _____ Credit Card No _____

Date _____ Signature _____

No. of Issues

Yearly

4

160/-

A Quarterly Magazine

Cheque / DDs should be drawn in favour of **The Air Era**

Send your Subscription to - C 25/2, DRDO Township, C.V. Raman Nagar, Bangalore 93

Ph: 9844483483, 9538107417, E-mail: theaireramagazine@gmail.com



Mr. K.V. Ravikumar
National Manager,
EDS Technologies Pvt. Ltd.

EDS Technologies Pvt. Ltd. (EDST), established in 1995, is the largest PLM and Real-Time Visual Simulation solutions provider in India, with its corporate office in Bangalore and having direct presence in Chennai, Gurgaon, Noida, Hyderabad, Coimbatore, Pune, Kochi, Mumbai, Kolkata and Ahmedabad. EDST, an established Value added reseller with global leaders like Dassault Systemes, Autodesk, SAP, Presagis, VT-MAK provides PLM and 3D Visual simulation COTS solutions, PLM Training and Trained on-site resources bringing in the most complete solution for any size and type of industry.

EDST's differentiation is its domain expertise, consultative approach and hands-on understanding of customer requirements required to drive successful implementations with world class training and technical support. Having more than 20 years of experience, EDST has the largest customer base in the Indian market with more than 1000 customers from aerospace, automotive & supply chains, industrial machinery, high-tech and electronics, railways, infrastructure, consumer packaged goods, engineering

service providers, defence, research and education sectors.

Mission

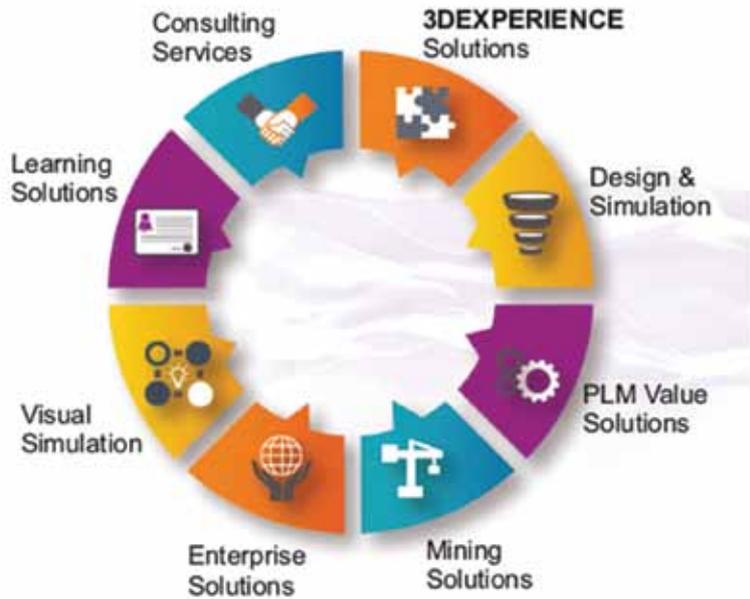
To provide high quality PLM and Visual Simulation solutions and deliver value to customer by taking ownership of their projects and delivering high quality results in a timely and cost efficient manner, thereby be profitable and market leader.

To instill and maintain in our customers base the highest level of confidence that their trust in our ability to deliver their requirements to their satisfaction is well placed and deserved.

Business Focus

EDS Technologies focus lies in understanding the challenges and the changing requirements of the customers and reacting positively to make the customers successful. EDST has met with considerable success in addressing the needs of a large number of clients from the Automotive, Aerospace, Heavy Engineering, Industrial equipment's, Education and Research in India & abroad and continues to establish a growing base of satisfied customers.





1995 as Deneb solutions

- Introduced portable CMM, Rapid prototyping Technology to India and supported leading research and industrial establishments for their rapid product development and all their reverse engineering needs
- Trained more than 7000 users on CATIA solutions till date
- Successfully implemented CATIA V5 at various OEM's and their suppliers like Force Motors, Mahindra & Mahindra, Ashok Leyland, Hero Honda, Tata Auto Plastics, Harita Seating Systems to name a few
- Numerous awards & accolades from our principals for "Best PLM Business Partner" and "CATIA Business Partner High Performer"
- Bought in QA implementation into leading Auto, Industrial and Tier 1 suppliers

Quality

EDS Technologies has a strong belief that the success of the organization is driven through the profitability of customers and partners. Hence, the quality enhancements are rigorously

hanged in the international standards with its wide experience in handling various projects.

Achievements

- Initiated the concept of Digital Manufacturing in India as early as





YOUR GATEWAY TO A WORLD OF OPPORTUNITIES

MVJ College of Engineering

MVJ College of Engineering was inceptioned in the year 1982, at the outskirts of Bangalore in the Whitefield area. The college is today ranked among the best Engineering Colleges in Karnataka. MVJCE has a modern campus with all facilities to create a conducive study environment.

MVJCE ranks high in Bengaluru for its singular dedication to world-

class engineering and management education. From being the first (under VTU) to offer Aeronautical Engineering courses, to earning 89 university ranks in the last 8 years alone, we enjoy a solid reputation among the student community, particularly those with a passion for engineering. Today we stand proud among the top 75 engineering colleges in India, top 10 engineering

colleges in Bengaluru, and 125 best B-schools.

The college is permanently affiliated to Visvesvaraya Technological University (VTU), Belgaum, Karnataka, and is approved by the All India Council of Technical Education (AICTE), Government of India, New Delhi.

Any time during the semesters, there are around four thousand students at the campus. College has several seminar halls and a state-of-the auditorium that has a seating capacity of over two thousand personal.

Amalgamation of the finest training procedures through well-equipped laboratories, and brilliant methods of inculcating professional ethics along with individuals' pursuits make the nuclei of this college. The students are encouraged to take part in annual sport competitions, and they have maintained



a reputation by fetching several prizes every year in sports. Cultural programs and social events are regular features.

MVJCE is the pioneer for Aeronautical Education under VTU. The Department of Aeronautical Engineering was established in the year 2003 and since then, it has made very significant progress. It has both the under graduate and post-graduate programs in Aeronautical Engineering. The department of Aeronautics has five exclusive Laboratories that comprise of Aerodynamic Lab, Structural Lab, Propulsion Lab, Modelling and Analysis Lab, and a Simulation Lab. There are high end PCs with the state-of-the art Software available to do the experiments as well as research and project works. Labs are well equipped for the conduct of BE and M tech experiments as well as the additional experiments are also possible for R&D work.

Our Aeronautical Students have been consistently making to several VTU ranks year after year. For the year 2014, there were seven ranks acquired by the BE(Aero) students including the 1st rank that fetched a Gold Medal. Two ranks were acquired by the M Tech (Aero) students.

Students are also encouraged to do projects that are outside the syllabus curriculum. For example, the development of an Aero-stat during the year 2013, was launched with great success. The projects objective was to design and develop a Aerostat system that can be used for aerial surveillance and has many more applications depending upon the payload utilised from an altitude of 50-100 meters.

MVJCE has emerged as a prestigious Institute of Academic Learning. The students get the best of opportunity in the form of highly advanced courses, eminent faculty members, well

equipped laboratories, library, hostels and immense facilities to excel in Research and Development. The college has a placement cell at the campus that is extremely active for tie up with industries, and campus placements.

The campus is Wi-Fi enabled, Students and faculty members can avail internet connection at any place in the college, hostel and nearby areas. The connectivity through a fully networked campus with state-of-the-art IT infrastructure, computing and communication resources, offer students the facilities of e-mail, net surfing, up/down loading of web based application, besides helping them in preparing projects & seminars.

There are VTU approved research centres at several departments for continuation of higher education and research activities. The centre of excellence in MVJCE focuses on research and education in engineering, science and management studies.

There are several MOU's with the industry and Educational Institutes. MVJCE in collaboration with Quest Global has established a state-of-the art training centre and finishing school in design, offering courses in Computer Aided Design / Manufacturing / Engineering (CAD/CAM/CAE/CATIA). This partnership with Quest has provided many opportunities for

students from Mechanical Engineering and Aeronautical Engineering departments.

MVJCE has tie-up with Microsoft for 'Ed-Vantage' program. MVJCE is a platinum level member of Microsoft 'Ed-vantage' program. As part of this program, the students of MVJCE can get certified for the Microsoft Certification Courses MOS(Microsoft Office), MTA(Microsoft Technology Associate) and MCP(Microsoft Certified Professional). MVJCE has a Microsoft Innovative Centre at the campus as a part of the program. Students can do live projects and can participate in project contests conducted by Microsoft. MVJCE is an advance level partner institute in the Campus Connect Program of Infosys Technology.

MVJCE has collaboration with National Instruments for establishing a Lab at the Centre of Excellence to provide trainings on Lab View program. MVJCE is a resource centre in Karnataka for the Spoken Tutorial Project of Indian Institute of Technology, Bombay, which promotes IIT literacy through Open Source Software.

Consideration is given towards institutional social commitment by way of imparting free training through workshops with hands on experience in areas like Photoshop Software etc, for the lesser privileged personnel.



CLASSIFIED •

Mobile: +91 - 9844483483, +91 - 9538107417 | Email: theaireramagazine@gmail.com



TECHNICAL Magazine | Books | Brochures | Leaflets
9538107417, 9844483483



R & D | Manufacturing | Technical Publications



A Q u a r t e r l y M a g a z i n e

**SUBSCRIBE
TODAY!**

Follow at

facebook

www.facebook.com/theairera

Mobile: +91 - 9844483483, +91 - 9538107417 | Email: theaireramagazine@gmail.com



**THE
AIR ERA**
Initiate. Innovate and Internalize!!

PROJECT your PROJECTS

THE AIR ERA magazine is an Aviation magazine aimed at bringing the best in Aviation that's happening around you. The latest technologies, insights from the creators, words of wisdom from the experienced, knowledge from educators, job opportunities directly from the companies, in short an overall feeling of flight from the best around. You have the opportunity to be a part of our team and display your project/project ideas to the people around and establish your name among the luminaries of Aviation...

Send across your project abstract of not more than 250 words. Selected few projects will be reviewed and called upon to present their project. The selected will then be helped to frame an article and thereafter display their respective project in the magazine.

Last date:
August 10th 2015

Send us your Abstracts to:
theaireramagazine@gmail.com

C O N T A C T D E A T A I L S

JOFFIN JOSE (Editor In Chief) 09538107417, Joffinjose.jose@gmail.com	ISON .N (Managing Editor) 9686031976, ison.nesamony@gmail.com
---	--

www.theairera.com

33 YEARS OF EXCELLENCE IN ENGINEERING EDUCATION

ENGINEERING / MCA / MBA / MTECH

Highlights

- Ranked among the Top 75 Engineering Colleges in India
Source: Outlook, June 2011, 2012, 2013 & 2014
- Positioned 3rd in Visvesvaraya Technological University (VTU)
for academic performance in the year 2013
- Has obtained 89 University ranks in last 8 years alone
- More than 20,000 Engineers have graduated till date
- 200+ hours of personality development and soft skills training
- More than 70 companies recruiting each year
- Highest salary package of 9 Lakhs
- Scholarships up to 90% for meritorious students



AICTE Approved



Affiliated to VTU

**RANKED AMONG THE TOP 10
ENGINEERING COLLEGES
IN BENGALURU**

Source: Outlook, June 2011, 2012, 2013 & 2014



✉ admission@mvjce.edu.in ☎ +91-9535499083 / +91-80-42991040

📍 Near ITPB, Whitefield, Bengaluru 560067