



PRINCIPAL'S MESSAGE

I am happy to inform that the Aeronautical Engineering Department is bringing out the Volume 2: Issue 1 of "Akshipth" newsletter for the year 2017. This news letter gives information regarding trending technology of Aeronautical industry and Departmental activities. I happily congratulate the members of the editorial board for their efforts in bringing out the newsletter. I wish all the best for their future endeavors.

Dr. Shrinivasa Mayya D.

H.O.D'S MESSAGE

The second volume of e-news letter AKSHIPTH has newer features with new editorial board members. Department of Aeronautical Engineering has set new benchmark not only for the students but also for the faculty members. The outcome is visible in the form of excellent performance in the academics by the students in the odd semester exams. It is worth mentioning here that many motivated students and faculty are taking self initiative either in conducting in-house training programs or in arranging invited lectures and workshops.

With the support from the management and the Principal, the department has very well established research facilities for the upcoming researchers, for aerodynamic testing of models. Keeping in view of upcoming AICTE regulation to have accreditation, it is very essential that the students and the faculty engage and re-orient themselves to involve more and more in research activities and publish their research findings in top international journals.

With placement activities happening, my earnest request to final year students is to 'fully utilize the opportunities and get placed' in one or the other companies. Another positive observation this year is the number of students appearing for the GATE exam 2018. It has increased multi-fold this time, and I wish them good luck.

Congratulations to team AKSHIPTH for presenting this informative e-news letter.



Dr. Ramakrishna N. Hegde

**Inside this
 issue:**

Page 1-2:

**Cheaper, lighter,
 quieter: “Fly the
 electric skies”.**

Page 3-4:

Skylon Space Plane

Page 5-6:

**Ongoing Stealth
 Technology.**

Page7:

**Aircraft Perform-
 ance Parameters.**

Page 8-9:

**Effect of high lift
 devices on Aerofoil.**

Page 10-12:

Spotlight

Page 13:

**Students Achieve-
 ments and events**

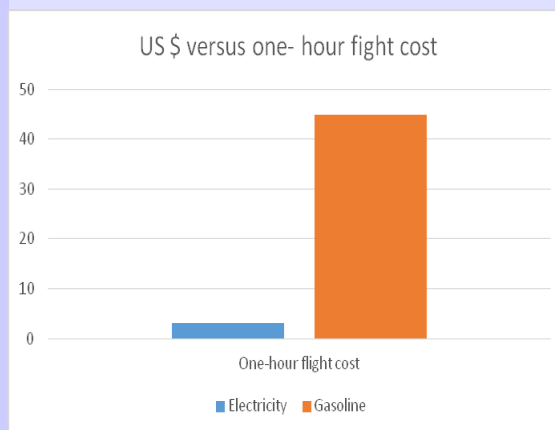
**The art of teaching
 is the art of assist-
 ing discovery.**

Cheaper, lighter, quieter: “Fly the electric skies”.

When you first sit in the cockpit of an electric-powered air- plane, you see nothing out of the ordinary. However, touch the start button and it strikes you immedi- ately: an eerie silence. There is no roar, no engine vibration, just the hum of electricity and the soft whoosh of the propeller. You can converse easily with the person in the next seat, without headphones. The silence is a boon to both those in the cockpit and those on the ground below.

An equivalent internal- combustion engine weighs about seven times as much and occupies some 120 by 90 by 90cm. In part because of the motor’s wonderful efficiency - it turns 95% of its electrical energy directly into work –an hour’s flight in this elec- tric plane consumes just US \$3 worth of electricity, versus \$45 worth a gasoline in a single- engine airplane.

It’s the cost advantage, even more than the silent operation that is most striking to a professional



You rev the motor not with a throt- tle but a rheostat, and its high torque but, available over a mag- nificently wide band of motor speeds, is conveyed to the propeller directly, with no power-sapping transmission. At 20 kilograms (45 pounds), the motor can be held in two hands, and it measures only 10 cm deep and 30 cm in diameter.

**President Obama
 gets to watch advanced
 episodes of 'Game of
 Thrones' episodes before
 the rest of the world.**

Flying in an expensive business. And, as technologists have shown time and again, if you bring down the cost of the product dramatically, you effec- tively create an entirely new product. Look no further than the \$300 supercomputer in your pocket.

The best preparation for tomorrow is doing your best today.

The English word 'minion' comes from the French word 'mignon', which means 'cute'.

EDITORIAL BOARD

CHIEF EDITOR

DR. RAMAKRISHNA N
HEGDE

EDITORS

Mr. DEEPAK RAJ P Y
Ms PAVANA K

EDITORIAL MEMBERS

4th YEAR

BHOOMIKA A.H
AAQIL
MAINUDDIN
BHARATH

3rd YEAR

VARUNI N
AKSHATHA
MANISH
DEEPTHI

2nd YEAR

ANJANAYA
VENKATESH A R
JEET
HARSHITHA R

It is not in the stars to hold our destiny but in ourselves.

Akshipth

A librocubicularist is someone who reads in bed.

Page 2

The company named as Bye Aerospace, in Englewood, Colombia. They had designed and build a two-seated aircraft called the **Sun Flyer** that runs on electricity alone. We expect to fly the plane, with the specs described above, later this year. They designed the aircraft for the application of pilot training, where the inability to carry a heavy payload or fly for more than 3 hours straight is not a problem and where cost is a major factor. But we believe that pilot training will be just the beginning of electric aviation. As batteries advancement and as engineers begins designing hybrid propulsion system paring motors with engines larger aircraft will make the transition to electricity. Such planes will eventually take over most short-hop, hub –and –spoke commuter flights, creating an affordable and quiet air service that will eventually reach right into urban areas, thereby giving rise to an entirely new category of convenient, low-cost aviation.

The sun flyer fills the perfect electric-plane niche that of trainer craft. Such airplane fly for a relatively short time, carry only two plane, and are quite enough to be based



near populated area. The key to the airplane feasibility is the development of more powerful battery, more efficient motor, and power saving tricks, such turning of the motor when it's not needed and using it to recover energy while descending or slowing down.

The problem was finding a suitably light, efficient motor. Years ago, in the early days of electric flight, they encounter aviators who consider dropping a conventional electric motor into an flight. But it weighed too much because of the heavy motor casings, the elaborate liquid-cooling systems, and the complex gearboxes. Their approach has been to work such a companies as Ensto, Geiger, Siemens and UQM, which have designed electric motors specifically for aerospace application.

*Courtesy: NASA

-Ravi A. P.
3rd Sem. AE

Most pilots and co-pilots on major airlines are not allowed to eat the same food to avoid the possibility of food poisoning sickening the entire flight crew.

If opportunity doesn't knock, build a door.

In the practice of tolerance, one's enemy is the best teacher.

Skylon Space Plane

Our universe is huge and unimaginable. It contains approximately 300 sextillion (3×10^{23}) stars and more than 100 billion (10^{11}) galaxies. The Sun is one of these stars present in the galaxy called The Milky Way. Earth is a small planet that revolves around the sun where we live. Since the beginning of History of Humans, man has dreamed of flying to stars but always thought of it as an impossible one. Yet flying to stars is impossible but journey to the Moon and planets is not indeed. In this century development of Spacecraft is remarkable.

History:

The origin of Skylon lies in the early 1980s when British engineers Alan Bond and Bob gave an idea that was revolutionary to assess to space, that could transform an industry in its infancy into an established and enabling transportation sector capable of supporting current markets and enabling institutional and commercial ventures that would otherwise be impossible. In the mid 1980s British Aerospace and Rolls Royce adopted the SSTO concept and technology. Rolls Royce started to work on Bond's engine design naming it RB545. British Aerospace employed its Space, Military and Civil aircraft divisions and integrated the engine into HTOL (Horizontal take off and landing) with both Government and industry funding. But their incapability in overcoming the challenges in time and its undesirable effects led to the

development of SKYLON – Space plane project.

Skylon:

It is a single stage to orbit, hypersonic plane that uses HTOL system like an ordinary aircraft. It could reach up to Low Earth Orbit (LEO) with a payload of about 15 tons. This system uses Combined Cycle Engine commonly known as Synergistic Air Breathing Rocket Engine (SABRE). It works both in air breathing and pure rocket mode. This permits



the vehicle to cruise at a hypersonic speed (Mach no. 5.5) within Earth's atmosphere. Skylon space plane is completely reusable. It flies into the orbit to perform missions like launching satellites and deliver crew and supplies to space station. This space plane is 84m long and 25m wing span and weighs 275 tons at take off.

The first woman in the U.S. to become licensed to fly a play was Harriet Quimby (1875–1912) in 1911. She was also the first woman to fly across the English Channel.

We know what we are, but know not what we may be.

Teachers can change lives with just the right mix of chalk and challenges.

SABRE (Synergistic Air Breathing Rocket Engine). This engine can achieve a speed of Mach 5.5. They require an operational life of only 55 hours to achieve 200 flights.

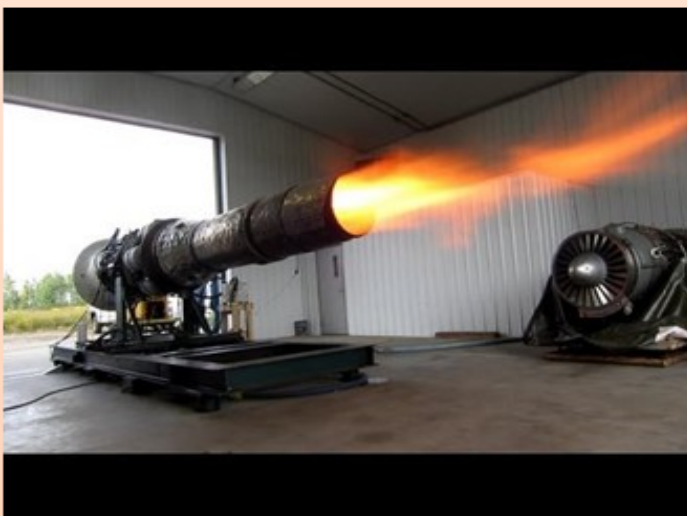
Material used :

It is made up of reinforced Carbon fiber plastic and consist of stringers, frames, ribs. The propellant tanks are made up of aluminum. Aero-shell is made up of ceramic.

Propellant used:

At the start of take off the vehicle weighs 275 tons while maximum landing weight is 55 tons. At take off the vehicle carries approximately 66 tons of liquid hydrogen and approximately 150 tons of liquid oxygen for the ascent.

A closed cycle of hydrogen and oxygen rocket engine with an unusual thermodynamic configuration keeps the space plane in motion. The first flight of SKYLON is expected to be carried in 2025.



**Courtesy: NASA*

**-Deepak M. K.
(3rd Sem. AE)**

Thousands of candles can be lighted from a single candle, and the life of the candle will not be shortened. Happiness

A journey of a thousand miles begins with a single step. Indeed Incredible India!

In 1963 Indian Space Research Organization (ISRO) launched its first rocket from Thumba Equatorial Launching Station.

The station had a single launch pad in the midst of coconut plantations. A local Catholic Church the St Mary Magadlene's Church served as the main office for the scientists. The bishop's house was converted into a workshop. A Cattle shed became the laboratory in which young Indian scientists like Abdul Kalam Azad worked and the rocket was transported to lift-off pad ON A BICYCLE. The second rocket, which was launched sometime later, was a little bigger and heavier and it was transported in a bullock cart for the lift off.



Always do your best. What you plant now, you will harvest later.

The aeroplane has unveiled for us the true face of the earth.

The Ongoing Stealth Technology

The stealth technology is to make the aircraft invisible to the radar. Radar works on the principle of sending burst of radio energy in one direction and gets the reflected energy back thus identifying a metal object flying up in the sky. The metal body is a very good signal reflector.

The early study showed that the aircraft can be made invisible to radar by two ways:

1. Reflecting the radar signal away from the radar equipment by promptly shaping the aircraft body flat and with very sharp edges. So that the radar signals gets scattered away at different angles and do not go back in the direction it came from.
2. To cover the aircraft with materials which absorb the radar signals/energy.

The result of the above will be the stealth airplane to have a radar signature of a small bird rather than a big aircraft. It was found from experiments that the above are not sufficient, one of the reason is the radar signature increased when the aircraft banks and do other maneuvers. A quick look at the F-22 reveals an adherence to the fundamental shaping principles of a stealth design. The leading and trailing edges of the wing and tail have identical sweep angles (a design technique called plan form alignment). The fuselage and canopy have sloping sides. The canopy seam, bay doors, and other surface interfaces are saw toothed.

The vertical tails are canted. The engine face is deeply hidden by a serpentine inlet duct and weapons are carried internally.



But the F-22 is not invisible to the enemy radar because of the heat, sound and other emissions from engine and hence it is likely to be detected by enemy radar.

Recently stealth enhancement has been done to eliminate tell-tale contracts sophisticated, untraceable sensors and radars, specially

designed hard to detect engine inlets, radar cancelling paint and cooling system for reducing planes heat signature. This gave birth to F117 fighter design

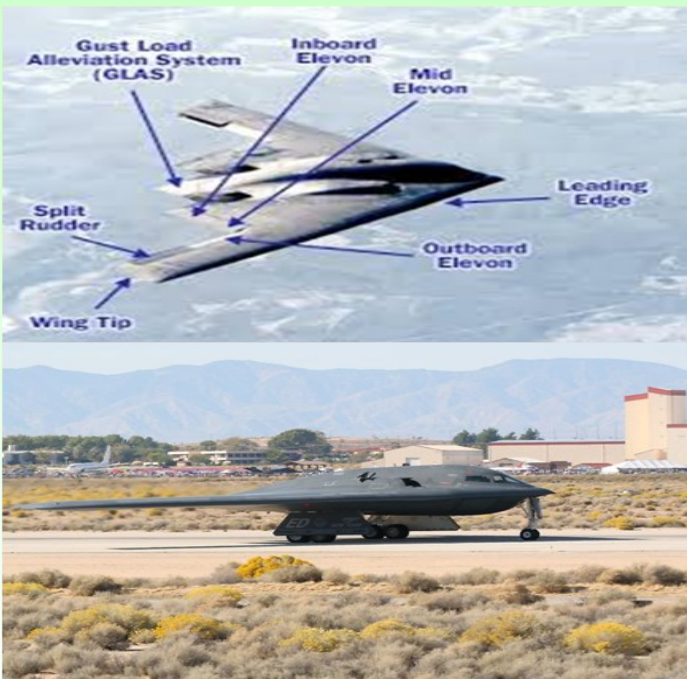
Failure will never overtake me if my determination to succeed is strong

‘Useless to dead, priceless to blind’ So after you die, donate your eye.



**A pilot must have 20/20 vision,
with or without corrective lenses,
to become a civilian airline pilot.**

Further study on Stealth revealed that any device fitted on the ventral side of the aircraft enhances its cross section especially during maneuver and hence the aircraft can be detected by enemy radar. Hence to overcome this anomaly, B2 bomber which is designed to go into the enemy territory on bombing mission was designed without vertical tail.



The essentiality of stealth technology is that the aircraft must be optimized to defeat high frequency bands. The low observable signature of the aircraft will cause resonant effect once the frequency wave length exceeds a threshold. This occurs when a feature on the aircraft such as tail fin is less than eight times the size of a particular frequency wave length. That is why B2 bomber is designed without vertical tail and rudder. The rudder is designed on the wing tip which splits to produce yaw.

The radar absorbent coating contains carbon black particles or tiny iron spheres on every surface of the aircraft which helps to conceal the aircraft from enemy radar.

It is found that the advanced VHF , UHF band early warning radars with large radar resolution cells, contacts are not tracked accurately and with the required precision to guide a weapon on a target. Thus on date stealth has matured enough but still studies are going on since AWACS aircraft which are flying at high altitude can detect stealth aircraft which are flying at low altitudes.

The on going project, the twin engine Advanced Medium Combat Aircraft (AMCA) designed by ADA is to be stealth with vertical fins.

**Courtesy: NASA*

**Stay positive
and happy. Work hard and don't give up
hope. Be open to criticism and keep learn-
ing. Surround yourself with happy, warm
and genuine people.**

Keep your eyes on the stars, and your feet on the ground.

Thank God men cannot fly, and lay waste the sky as well as the earth.

Aircraft Performance Parameters

Manufacturer	BOE-ING	Max. cruise :	
Type	737-	Speed (kt)	488
Model	200	Altitude (ft)	25000
PERFORMANCE		Fuel consumption (kg/h)	4005
Loadings:		Long range cruise:	
Max. Power Load (kg/kN)	367.91	Speed (kt)	420
Max. Wing Load (kg/m ²)	575.46	Altitude (ft)	35000
Thrust/Weight Ratio	0.2771	Fuel consumption (kg/h)	2827
Take-off (m):		Range (nm):	
ISA sea level	1829	Max. payload	1549
ISA +20°C SL.	1859	Design range	1900
ISA 5000ft	2886	Max. fuel (+ payload)	2887
ISA +20°C 5000ft	3292	Ferry range	
Landing (m):		Design Parameters:	
ISA sea level.	1350	W/SC_{Lmax}	1845.48
ISA +20°C SL.	1350	W/aC_{LtoST}	2537.71
ISA 5000ft	1615	Fuel/pax/nm (kg)	0.0632
ISA +20°C 5000ft	1615	Seats x Range (seats.nm)	218500
Speeds (kt/Mach):			
V_2	147		
V_{app}	131		
V_{no}/M_{mo}	350/M0.84		
V_{ne}/M_{me}			
C_{Lmax} (T/O)	2.32		
C_{Lmax} (L/D @ MLM)	3.06		

Aircraft	F22
Loaded weight	29300
Empty weight	19700
Take off weight	38000
Thrust in kN	2*104kN(156kN)
Thrust in kN	208
Afterburner	312
Given T/W	1.09
Matching T/W	1.09
T/W	0.72
Mach	2.25
Range in km	2960
Rate of Climb	200
Service ceiling in m	19812
Wing span in m	13.56
Wing area in m ²	78.04
Aspect Ratio	2.36
W/S in N/m ²	3683.15
Given wingloading	375



*Courtesy: Boeing

Ms. Pavana Naik

Wherever you go, no matter what the weather, always bring your own sunshine.

Ignorance is the curse of God; knowledge is the wing wherewith we fly to heaven.

Effect of High Lift Devices on Aerofoil

MS. P. Neelima, Assistant Professor
Department of Aeronautical Engineering

In the given paper “Effect of High Lift Devices on Aerofoil” has been discussed. The main effect produced by flap deflection is an increase in the effective camber of airfoil, Effect on CL - α curve. Most of the lift increment is located near the trailing edge of an airfoil, the centre of pressure is moved aft, and hence there is a nose-down change in the pitching moment.

Classification of high lift devices :

- Those which alters the geometry of an airfoil (Trailing edge flaps(plain flap, split flap, slotted flap, fowler flap, zap flap), Leading edge slots, Leading edge flaps)
- Those which controls the Behaviour of boundary layer (Boundary layer suction, Boundary layer blowing, Jet flap)
- These are few devices which operates on both the principles (Ex : slotted flap, fowler flap)

Trailing edge flaps :

It is simply a small auxiliary aerofoil located at the Trailing edge of main wing and it can be deflected about a given line where it is hinged. These deflection causes change in the geometry of the aerofoil and hence change in the geometric characteristics and therefore changes its aerodynamic characteristics and therefore increases the lift. The main types of trailing edge flaps are as follows, Plain flap. It is the portion of trailing edge of an aerofoil which is hinged so that it can be deflected downwards.

The deflection causes increase in the camber of an aerofoil and hence changes its aerodynamic characteristics.

Split Flap:

In split flap only the lower surface of rear part of the airfoil is movable leaving the upper surface geometry unchanged when the flap is deflected as shown in figure above

Slotted Flap:

The air below the wing is at high pressure than the air above it. When the slot is opened the air blows through the slot on to the upper surface of the flap where it reenergizes the boundary layer and prevents the separation.

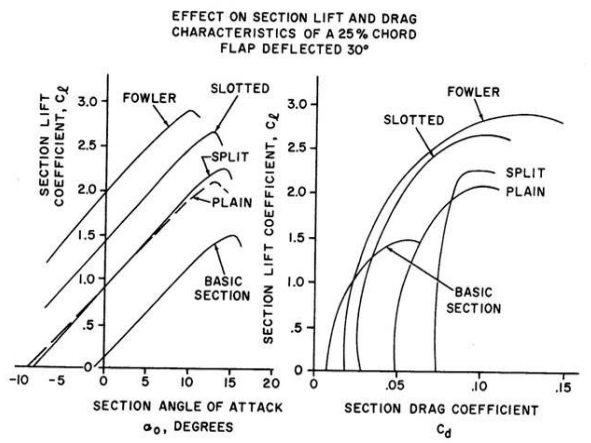
Zap flap:

It is a combination of split flap and fowler flap, the zap flap gives the highest lift increment than split flap and higher drag increment than fowler flap and hence the performance is best under all the conditions.

Leading edge slots:

At low incidences there is no significant effect on lift, since there is no tendency of flow separation. As the incidence approaches the stalling angle and the effect of separation starts and now the slot prevents the separation by re-energizing the boundary layer so that lift coefficient continues to increase and stall is delayed.

Because of your smile, you make life more beautiful.



ENGINEERS DAY

The leading edge flaps (droop snoot):

Separation bubble: Many high speed airfoil sections have fairly sharp leading edges. The flow around the leading edge has to negotiate a sharp bend which is not possible; this gives rise to a region of separated flow at the leading edge known as separation bubble.

Prevention of separation bubble:

The separation bubble can be prevented by using certain amount of camber at the leading edge. so that the flow can overcome the leading edge smoothly and stall is considerably delayed.

Advantages:

- The increase in effective camber causes increase in Drag so that (L/D) ratio is reduced which results in steeper glide path during landing.
- The reduction in stalling angle is also beneficial since it decreases the incidence at the time of take-off and landing and therefore an aircraft operates in less nose up attitude. Thus pilot's range of region improved.

The risk of being killed in a plane crash for the average American is 1 in 11 million. The risk of being killed in a car accident is 1 in 5,000.

The greatest self is a peaceful smile, that always sees the world smiling back.

Just remember, once you're over the hill you begin to pick up speed.



AMARA INAUGURATION



TEACHERS DAY CELEBRATION

Design is not just what it looks like and feels like. Design is how it works.

Airplane travel is nature's way of making you look like your passport photo.



SWACHH BHARATH ABHIYAN

FINANCIAL EDUCATION WORKSHOP



Capturing a beautiful moment in a photo is something I'm very passionate about.

She glances at the photo, and the pilot light of memory flickers in her eyes.



ART BY:

YATHIN C P

Life isn't about finding yourself. Life is about creating yourself.

Friends are the best to turn to when you're having a rough day.

Students Result (8th Sem Aeronautical) - 2017

98%



SIT Mangalore various events 2017

Holidays	Sept. 29th	Maha Navami
	Sept. 30th	Vijayadashami
	Oct. 2nd	Gandhi jayanthi
	Oct. 18th	Naraka chaturdasi
	Oct. 20th	Balipadyami
	Nov. 1st	Kannada Rajyostava
Internal assessment Test	2nd internal tests	15, 16, 17 October 2017
	3rd internal tests	16, 17, 18 November 2017

Our greatest glory is not in never falling, but in rising every time we fall.

Only I can change my life. No one can do it for me.

AMARA

PRESIDENT

KARTHIK BORKAR G

ORGANIZING SECRETARY

NAVANEESH N AMIN

JOINT TREASURER

PRAVEEN B

JOINT SECRETARY

MOHAMMED FARHAN SHEIK

SAC PRESIDENT

JUNAID AHMAD M MISRIKOTI

OFFICE BEARERS

DEEKSHITHA H L

VISHAL S L

SHEKH SHAFI

THUSHAR S D

JAGADEESH B K

You will not be punished for your anger, you will be punished by your anger.

-Buddha



For feed back: srinivasaeroclub@gmail.com

You are never too old to set another goal or to dream a new dream.