Torque Back

The news letter of the Hobart Model Aero Club inc.

What keeps my bird in the sky?

Mystery of the wing.

www.hobartmodelaeroclub.org.au

Vol. 12 No. 03 July - August 2012

COCKPIT TORQUE

Welcome to the 2012-2013 New cockpit crew

The new committee now consists of:

Captain: *(President)*	Tony Gray
Co-Pilot: *(Vice President)*	Mike Rutledge
Purser: *(Treasurer)*	William Deal
Spare Co-pilot: *(Secretary)*	Tony Sheppard
Cabin Crew: *(Committee)*	Bob McAllister Phil Harrington Nils Powell

Regards,

Tony Sheppard.

IN THIS ISSUE

Hobart Model Aero Club inc.

PO Box 1117

Rosny Park 7018.

EDITOR'S INTERNET FIND

For all those whom want to make their own personalised decals try the Avery clear labels (or similar) for inkjet (and/or laser. Check the packet to see if they are suitable for laser printers). Once the printing has been done then spay with a waterproof spray such as a clear lacquer.

EVENTS FOR 2012

EVENT CALENDAR - 2012/13		
Date	HMAC	LMAC
Sunday 29/07/2012	**Tomboys**	
Saturday 15/09/2012	**Aerobatics**	
Sunday 28/04/2012	**Stand-off Scale**	
??/10/2012	**Control-line event**	
Saturday 17/11/2012	**Control-line event**	
Sunday 02/12/2012	**Christmas Lunch**	
Please note :- events are subject to change or new ones added		

In the next Edition

A look a Vacuum Forming

Cover picture: model :- a Super Cub.   Pilot:- Tony Gray. Engine:- 120 OS twin.

FIELD TORQUE

Models at the Field

By:- Mike Rutledge

Among the new models seen at the field in January were a Texan AT-6 ARF and a scratch built Ugly Stik.

The AT-6 is a World Models aircraft well put together by Angus MacNeil, it has a span of 72" and weighs 3.8Kg. Gus has chosen to put a 30year old OS90FS in the nose, it started easily and sounded just great when test run. Gus gives the ARF a good wrap for the model construction and the instructions for assembly which were easy to follow. Good job Angus with a build time of just two weeks.

Robert Gurney built the Ugly Stik from the original Phil Craft plans over a two month period. Modifications included ditching the trike gear for a tail dragger setup and foam core wings which Robert cut himself. The plane has an OSAX46 for power and a JR 36MHz radio with Hitec servos. Good to see traditionally built, nicely turned out models still being constructed by our members.

i(Keep up the good work Mike, thanks for your input Ed)

Angus MacNeil :- AT-6 Texan

Robert Gurney:- Scratch Built Ugly Stick

FIELD TORQUE

Phil Harrngton's—Vampire

Chris Rowe's—Turbulent

Modern Jetex models

www.Jetex.org

SCALE TORQUE

STANDOFF SCALE SATURDAY 19 MAY

This event was blessed with light and variable winds and an overcast sky
This was the second scale event on the calendar held this season, and added to the flying was the landing circuit, judged separately from the landing.

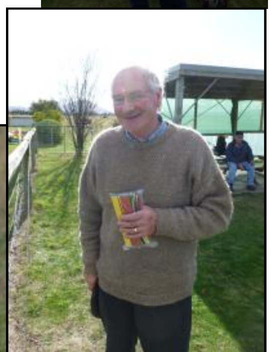
The CD was aided by the same three judges for the previous event, Dave Christian , Gavin Hallam Geoff Leverton. The judges conferred to come up with a score for flying and the static judging .
It was very encouraging to get ten entries a week before the event and to have a visitor from LMAC
Chris Klimick with a 1/3 scale Fly Baby and a1/4 scale Stampe bi-plane powered by Ryobi brushcutter 30cc motor. A total of fourteen aircraft were entered . At 10 am each entrant filled out the score sheet with the aircraft details and radio frequency .After the static judging the flying commenced .Some models used the cross strip and landed on the main strip due to the variable light wind.

The flying consisted of the take off ,realism in the air , the landing circuit , then the actual touchdown ,each one of these was judged from maximum of 10 points .If you were on final and were not happy with your approach ,you could call "going around " and make another landing attempt, being judged on the last landing .This helped to avert any landing crashes .There were a couple of overshoots and nose overs, no broken models.

Flying was over by 12/30 , members headed to the clubhouse for lunch provided by Colleen and crew, followed by the prize giving.

1st Peter Ederle's super cub.

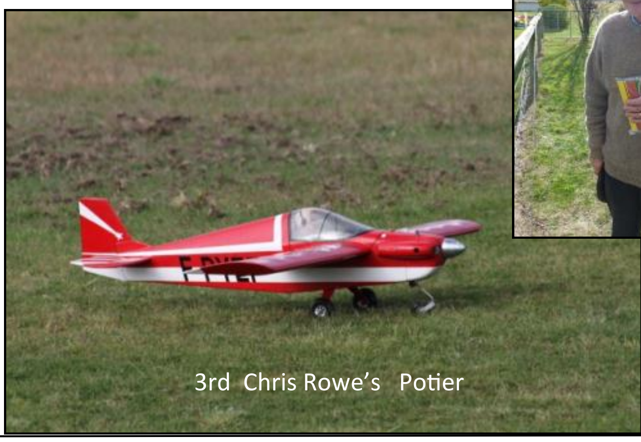
2nd Chris Klimic .



Results
1st :- Peter Ederle, an RX battery pack.
2nd:- Chris Klimick, second , one litre fuel.
3rd:- Chris Rowe , third , An assorted pack of heat shrink tube.

Thanks to the judges and the canteen for the lunch.

Tony Gray
Competition Director



3rd Chris Rowe's Potier

BENCH TORQUE

Cheap Chinese Servos

HOW DO THEY STACK UP?

By:- Bruce Simpson
http://www.rcmodelreviews.com

For a long time there was a very limited choice of servo brands.

Futaba, JR and Hitec were the main servo manufacturers and although their offerings have always been of excellent quality, the prices have also been quite high.

And then the Chinese started making servos that they now sell under a wide number of different brands.

But are they any good?

When a single faulty servo can cause a very expensive crash, is it really worth trying to save a few dollars by purchasing a cheap servo from an unknown manufacturer?

Testing servos

Over coming months I'll be testing an increasing number of different Chinese-made servos of all types and brands.

Right now I'm building a test-rig that will automatically plot speeds, accuracy, centering, overshoot, torque, current-draw and other important aspects of a servo's performance.

But in the meantime, I've rounded up a few good and bad examples.

The Good

I've had very good success with the following servos:

- Hextronic HXT900 (cheap, powerful light)
- Scanner RC servos (powerful light, reliable)
- Vigor VS2 (very cheap and good value)

I'll be posting more in-depth reviews of these little gems shortly.

The Bad

Perhaps the worst servos I've ever had the misfortune to waste my money on are the TowerPro MG995 hi-torque metal-geared servos you often see advertised on eBay and various online model shops.

These are an extremely heavy servo with poor accuracy, massive amounts of over-shoot, highly variable centering and low levels of reliability. While I might be prepared to risk one on an old model truck or buggy, I most certainly would not dare to use one on a model airplane.

And despite what some of the ads claim, these are not coreless servos. In fact one of the reasons they perform so poorly is that they use a heavy 3-pole motor that has lots of inertia.

An updated version of this servo (marketed as the Toward Pro MG996R) is quite a bit better in its accuracy and centering but, because it uses the same cheap parts, still can't be considered a servo worth trusting an expensive model to.

BENCH TORQUE

The Rest

Right now I have a desk littered with servos of all sizes, shapes and brands so the testing task ahead of me is somewhat onerous -- but stay tuned because I'll gradually work my way through all the options and provide a detailed report on my findings.

Summary

Yes, the Chinese are getting their act together when it comes to making servos that can rival the big names but be very careful, there are some awfully bad designs out there and others that are quite badly assembled.

Those on the "What's Good" list can be purchased with some degree of certainty that they'll provide good service but if you're thinking of buying an unknown brand, be very careful.

FEATURE TORQUE

Aerodynamics

http://adamone.rchomepage.com/index2.htm

Introduction

Aerodynamics is the study of forces and motion of objects through the air.

Basic knowledge of the aerodynamic principles is highly recommended before getting involved in building and/or flying model aircraft.

JAS 39 - Gripen (Griffin)

A model aircraft that is hanging still in air during strong winds may be subject to the same aerodynamic forces as a model aircraft that is flying fast during calm weather.

The aerodynamic forces depend much on the air density. A Glider Model for example glides 25 metres from a given altitude during low air density it may glide 40 meters during high density.

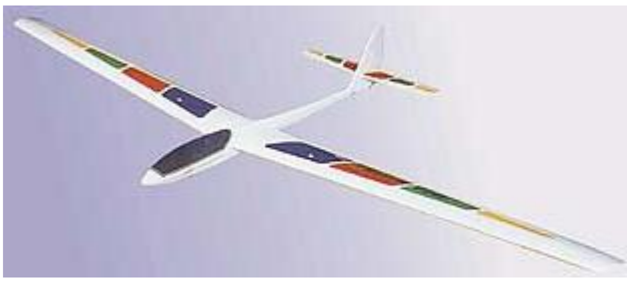
The air density depends on the atmospheric pressure and on the air temperature. Air density increases with decreasing of the air temperature and/or with increasing of the atmospheric pressure. The air density decreases with increasing of the air temperature and/or with decreasing of the atmospheric pressure.

A flying aircraft is subject to a pressure depending on the airspeed and the air density. This pressure increases exponentially with increasing of the airspeed. The aircraft's resistance to the airflow (drag) depends on the shape of the fuselage and flying surfaces. An aircraft that is intended to fly fast has a thinner and different wing profile than one that is intended to fly slower.

That's why many aircraft change their wings' profiles on landing approach by lowering the flaps located at the wings' trailing edge and the slats at the leading edge in order to keep enough lifting force during the much lower landing speed.

The wings' profile of an aircraft is usually asymmetric, which makes the pressure on the wings' upper side lower than the underside, causing the air on the wings upper side to accelerate downwards, thereby a lift force is created.

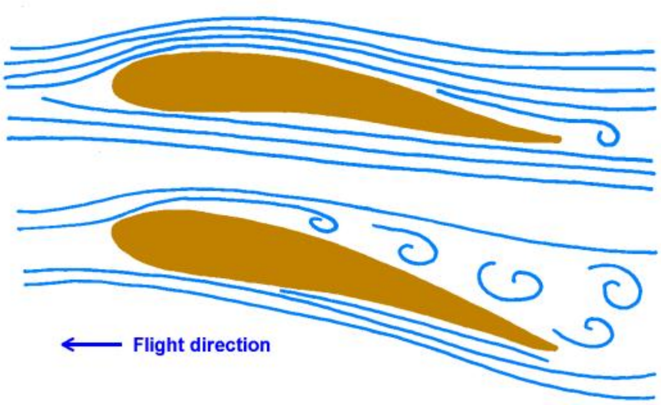
The air always flows away from areas of higher pressure toward areas of lower pressure, thus the air over the wing top accelerates as it enters the lower pressure region (where the air curves toward the wing), whereas the air under the wing slows down as it enters the higher pressure region. So, one may also say that the wings create lift by reacting against the air flow, driving it downwards, producing downwash. The top of the wing is often the major lift contributor, usually producing twice as much lift as the bottom of the wing.



The lift force of a symmetric profile is based on the airspeed and on a positive angle of attack to the airflow, which makes the air react as it was asymmetric.

FEATURE TORQUE CONT.

The following picture shows the airflow through two wing profiles. inside a thermal to gain altitude without flapping their wings. Gliders can do exactly the same thing.



The uppermost profile has a lower angle of attack than the lowest one. When the air flows evenly through the surface is called a laminar flow. A too high angle of attack causes turbulence on the upper surface, which dramatically increases the air resistance (drag), this may cause the flow to separate from the upper surface resulting in an abrut reduction in lift,

known as stall.

Summarising:

The aircraft generates lift by moving through the air. The wings have aerofoil shaped profiles that create a pressure difference between upper and lower wing surfaces, with a high pressure region underneath and a low pressure region on top. The lift produced will be proportional to the size of the wings, the square of airspeed, the density of the surrounding air and the wing's angle of attack to on-coming flow before reaching the stall angle.

How does a glider generate the velocity needed for flight?

The simple answer is that a glider trades altitude for velocity. It trades the potential energy difference from a higher altitude to a lower altitude to produce kinetic energy, which means velocity. Gliders are always descending relative to the air in which they are flying.

How do gliders stay aloft for hours if they constantly descend?

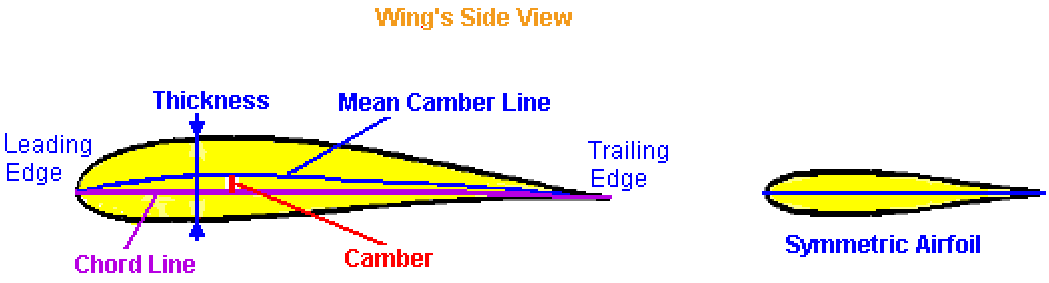
The gliders are designed to descend very slowly. If the pilot can locate a pocket of air that is rising faster than the glider is descending, the glider can actually gain altitude, increasing its potential energy. Pockets of rising air are called updrafts. Updrafts are found when the wind blowing at a hill or mountain rises to climb over it. (However, there may be a downdraft on the other side!) Updrafts can also be found over dark land masses that absorb more heat from the sun than light land masses. The heat from the ground heats the surrounding air, which causes the air to rise. The rising pockets of hot air are called thermals.

Large gliding birds, such as owls and hawks, are often seen circling inside a thermal to gain altitude without flapping their wings. Gliders can do exactly the same thing.

FEATURE TORQUE CONT.

Wing Geometry Definitions

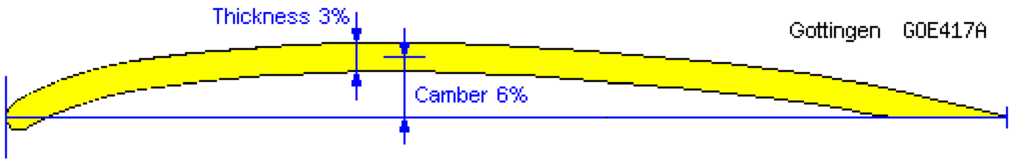
A vertical cut through the wing parallel to flight's direction (plan view) will show the cross-section of the wing. This side view (profile) is called Aerofoil, and it has some geometry definitions of its own as shown on the picture below.



The longest straight line that can be drawn from the Aerofoil's leading edge to trailing edge is called the Chord Line. The Chord Line cuts the aerofoil into an upper surface and a lower surface. If we plot the points that lie halfway between the upper and lower surfaces, we obtain a curve called the Mean Camber Line.

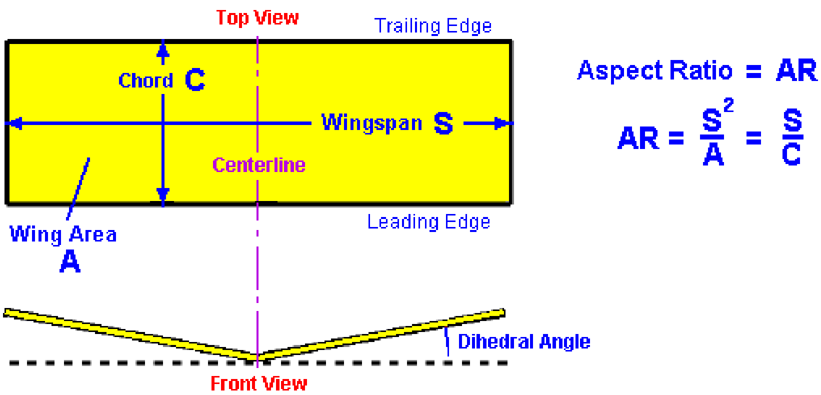
For a symmetric aerofoil (upper surface the same shape as the lower surface) the Mean Camber Line will fall on top of the Chord Line. But for an asymmetric aerofoil, these are two separate lines. The maximum distance between these two lines is called the Camber, which is a measure of the curvature of the aerofoil (high camber means high curvature). Asymmetric aerofoils are also known as cambered aerofoils.

The maximum distance between the upper and lower surfaces is called the Thickness. Both Thickness and Camber are expressed as a percentage of Chord.



Aerofoils can come with all kinds of combinations of camber and thickness distributions. They are designed for the conditions under which the plane is likely to be flown most of the time. NACA (the precursor of NASA) established a method of designating classes of aerofoils and then wind tunnel tested the aerofoils in order to provide lift coefficients and drag coefficients for designers.

Aspect Ratio is a measure of how long and slender a wing is from tip to tip. The Aspect Ratio of a wing is defined to be the square of the span divided by the wing area and is given the symbol AR. The formula is simplified for a rectangular wing, as being the ratio of the span to the chord length as shown on the figure below.



FEATURE TORQUE CONT.

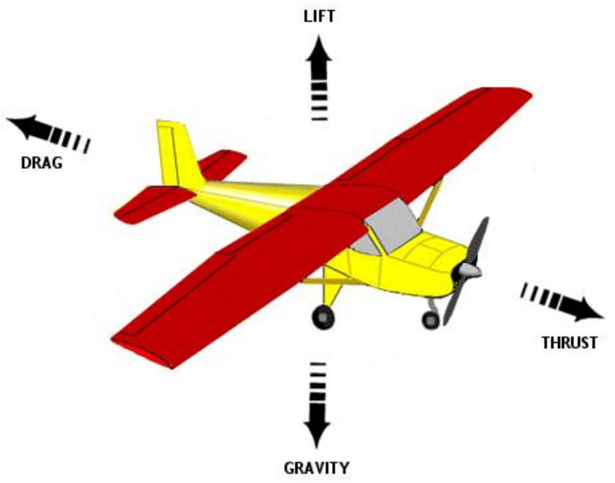
Wing Dihedral refers to the angle of wing panels as seen in the aircraft's front view.

Dihedral is added to the wings for roll stability; a wing with some Dihedral will naturally return to its original position if it is subject to a briefly slight roll displacement. Most large airliner wings are designed with Dihedral. On the contrary the highly manoeuvrable fighter planes have no Dihedral. In fact, some fighter aircraft have the wing tips lower than the roots, giving the aircraft a high roll rate. A negative Dihedral angle bis called Anhedral.

Forces in Flight

Gravity, Lift, Thrust and Drag.

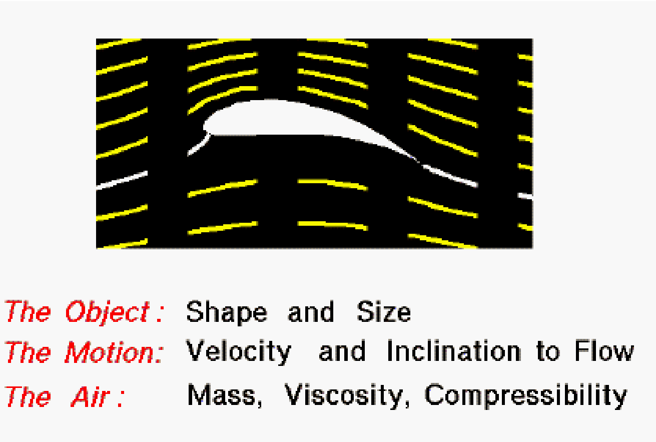
Gravity is a force that is always directed toward the centre of the earth. The magnitude of the force depends on the mass of all the aircraft parts. The gravity is also called weight and is distributed throughout the aircraft. But we can think of it as collected and acting through a single point called the centre of gravity.



In flight, the aircraft rotates about its centre of gravity, but the direction of the weight force always remains toward the centre of the earth. Lift is the force generated in order to overcome the weight, which makes the aircraft fly. This force is obtained by the motion of the aircraft through the air.

actors that affect lift:

Lift force is therefore dependent on the density of the air r, the airspeed V, the type of airfoil and on the wing’s area according to the formula below.



Lift Force = 0.5 * r * V2 * Wing's Lift Coefficient * Wing Area

Where the Lift Force is in Newton, Wing Area in m2 and the airspeed in m/s.

The standard density of the air is 1.225kg/m3.

The wing's lift coefficient is a dimensionless number that depends on the airfoil type, the wings aspect ratio (AR), Reynolds Number and is proportional to the angle of attack (AoA) before reaching the stall angle. Thrust is the force generated by some kind of propulsion system.

FEATURE TORQUE CONT.

The magnitude of the thrust depends on many factors associated with the propulsion system used:

- type of engine
- number of engines
- throttle setting
- speed

The direction of the force depends on how the engines are attached to the aircraft.

The glider, however, has no engine to generate thrust. It uses the potential energy difference from a higher altitude to a lower altitude to produce kinetic energy, which means velocity.

Gliders are always descending relative to the air in which they are flying.

Drag is the aerodynamic force that opposes an aircraft's motion through the air.

Drag is generated by every part of the aircraft (even the engines).

There are several sources of drag:

One of them is the skin friction between the molecules of the air and the surface of the aircraft.

The skin friction causes the air near the wing's surface to slow down.

This slowed down layer of air is called the boundary layer.

The boundary layer builds up thicker when moving from the front of the airfoil

toward the wing trailing edge.

Another factor is called the *Reynolds effect*, which means that the slower we fly, the thicker the boundary layer becomes.

Form drag is another source of drag.

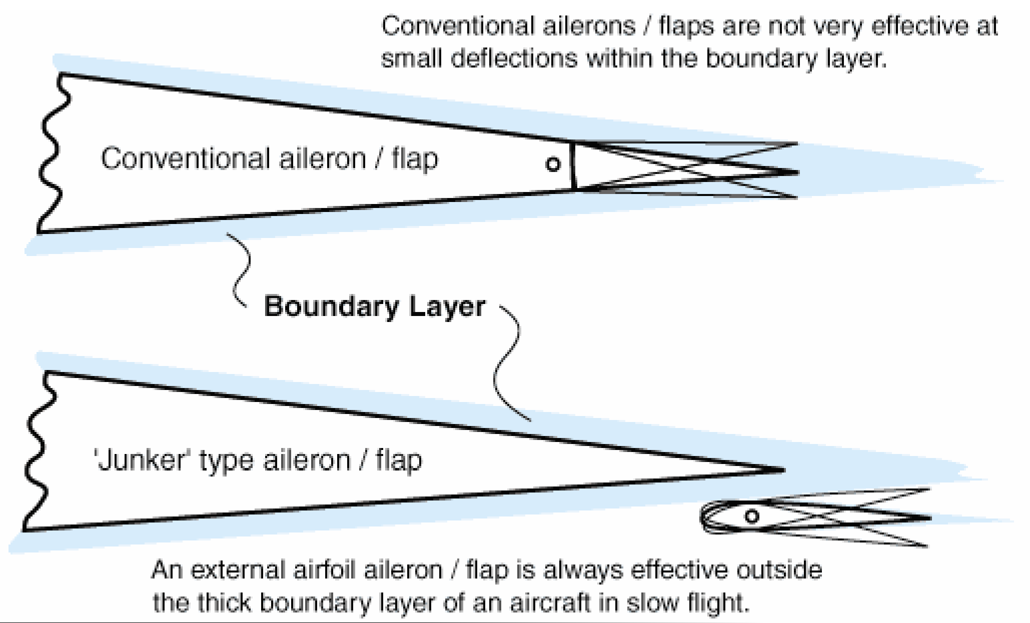
This one depends on the shape of the aircraft.

As the air flows around the surfaces, the local airspeed and pressure changes.

The component of the aerodynamic force on the wing that is opposed

to the motion is the wing's drag, while the component perpendicular to the

motion is the wing's lift.



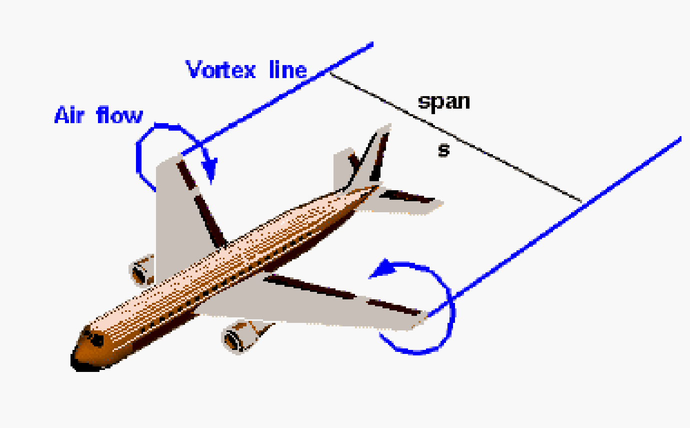
Induced drag is a sort of drag caused by the wing's generation ~~of lift.~~

One cause of this drag is the flow near the wing tips being distorted as a result

FEATURE TORQUE CONT.

As the air flows around the surfaces, the local airspeed and pressure changes. The component of the aerodynamic force on the wing that is opposed to the motion is the wing's drag, while the component perpendicular to the motion is the wing's lift.

Induced drag is a sort of drag caused by the wing's generation of lift. One cause of this drag is the flow near the wing tips being distorted as a result of the pressure difference between the top and the bottom of the wing, which in turn results in swirling vortices being formed at the **wing tips**.



Pressure difference across wing surface causes spillage around wing tips.

The induced drag is an indication of the amount of energy lost to the tip vortices. The swirling vortices cause downwash near the wing tips, which reduces the overall lift coefficient of the wing.

The picture below shows the downwash caused by an aircraft. The Cessna Citation has just flown through a cloud.

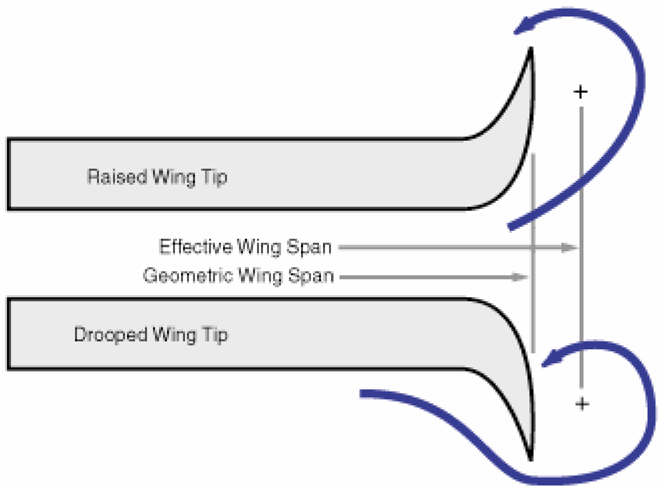
FEATURE TORQUE CONT.

The downwash from the wing has pushed a trough into the cloud deck. The swirling flow from the tip vortices is also evident.

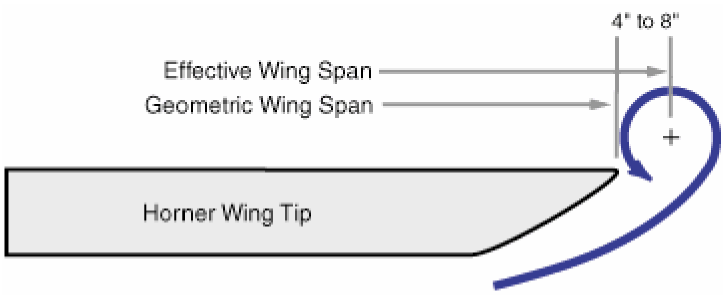
The wing geometry (aspect ratio AR) also affects the amount of induced drag: Long wing with a small chord (high AR) has low induced drag, whereas a short wing with a large chord (low AR) has high-induced drag. For the same chord, the wing with a high AR has higher lift coefficient, but stalls at lower angle of attack (AoA) than the wing with a low AR.

Also, aircraft with high AR wings are more sensitive to elevator control. The induced drag increases with increasing of the wing's actual lift coefficient being generated and it's proportional to the square of the angle of attack. And since a slower airspeed requires a higher angle of attack (AoA) to produce the same lift, the slower the airspeed is, the greater the induced drag will be. So, the induced drag is also inversely proportional to the square of the airspeed. In order to minimise tip vortices some designers design a special shape for the wing tips.

With drooped or raised wing tips, the vortex is forced further out.



However, this method will cause an increase in weight since they need to be added to the wing tip. An easier and lighter method is by cutting the wing tip at 45-degrees. With a small radius at the bottom and a relatively sharp top corner, the air from the secondary flow travels around the rounded bottom but can't go around the sharp top corner and is pushed outward.

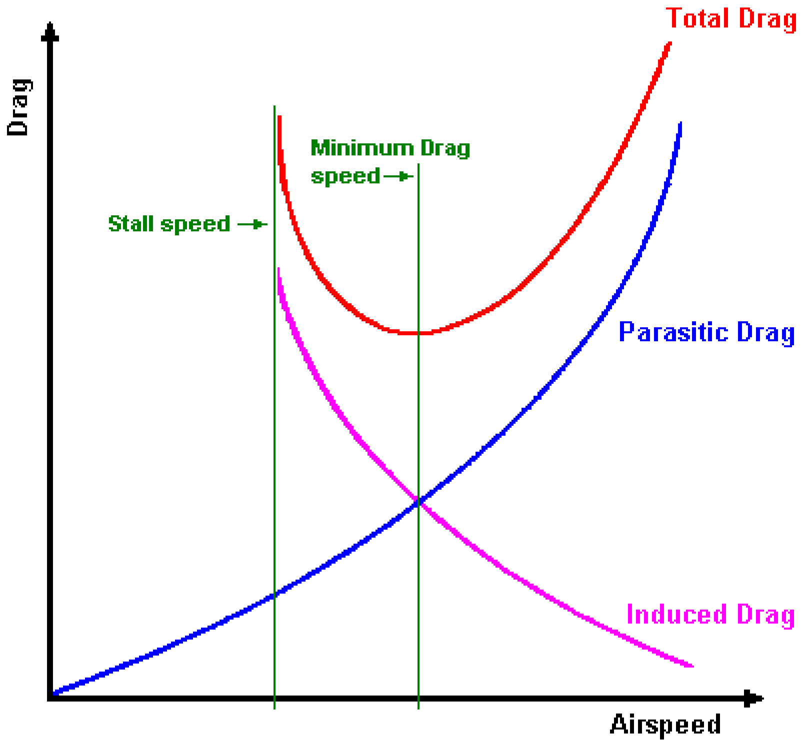


There's also the Interference drag, which is generated by the mixing of streamlines between one or more components, it accounts for 5 to 10% of the drag on an airplane. It can be reduced by proper fairing and filleting which allows the streamlines to meet gradually rather than abruptly.

FEATURE TORQUE CONT.

The downwash from the wing has pushed a tro All drag that is not associated with the production of lift is defined as Parasitic drag.

The graph below shows the induced and the parasitic drag versus airspeed. Total drag is the induced drag plus the parasitic drag.

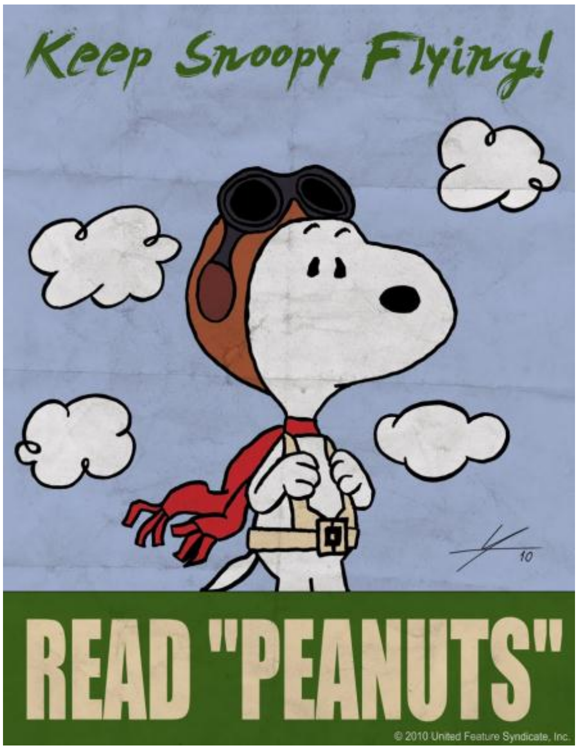


Since during constant speed and level flight the thrust is equal to the total drag the graph also shows how much thrust is needed at different level flight speeds.

At take-off (just above the stall speed), a high AoA is needed to get enough lift which increases the total drag and also the thrust needed. As the speed increases, the AoA needed to get the same lift decreases and so does the total drag until the minimum drag speed is reached, above which the total drag starts increasing exponentially (and so does the thrust needed).

The plane's max level speed will be limited by the prop's pitch speed or by the max thrust available, which altogether means by the max power available.

To Be Continued in next edition..



HISTORY TORQUES 1934

MacRobertson Centenary Air Race 1934

http://www.sl.nsw.gov.au/discover_collections/history_nation/aviation/crossing_oceans/air/macrobertson.html

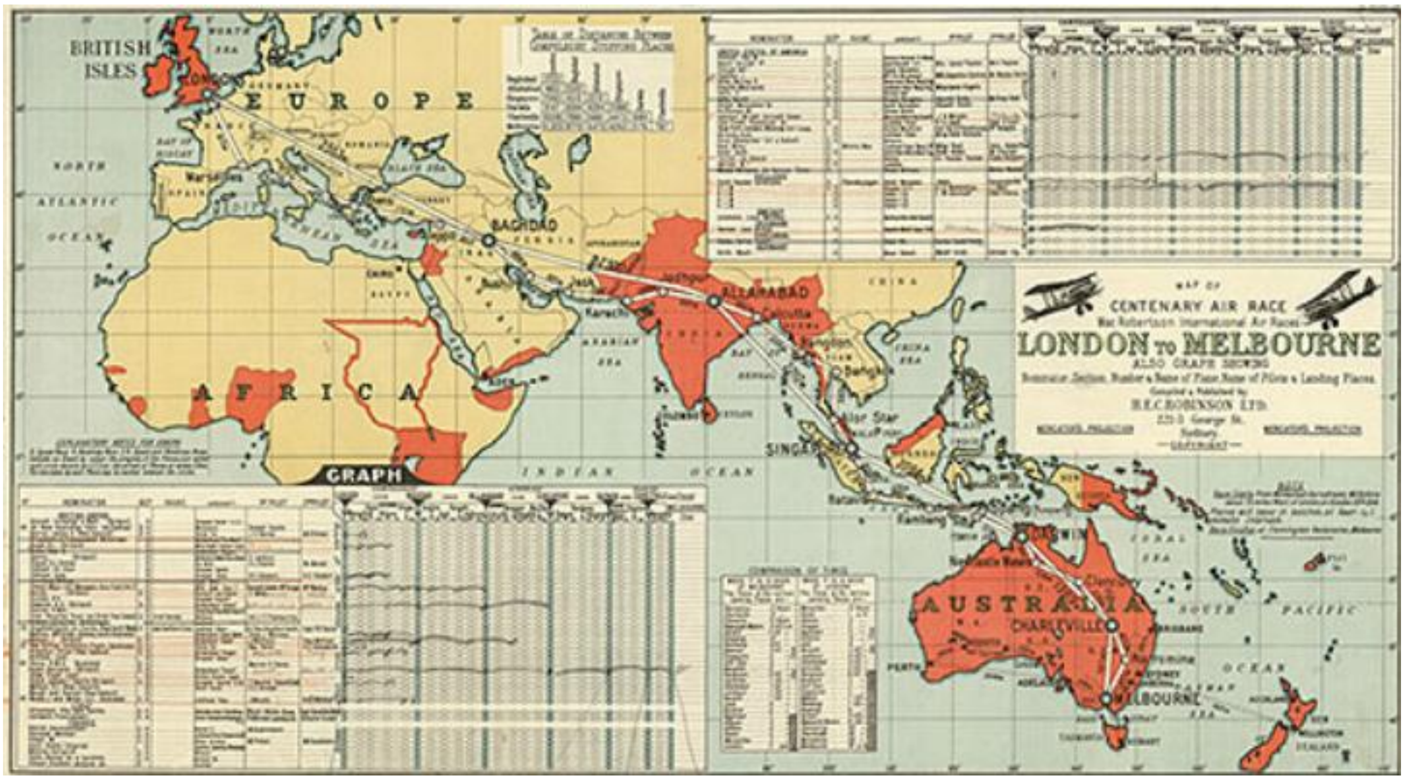
Who were these men and what had they done?

A spectacular flying race was held in 1934 to celebrate Melbourne's 100th anniversary. The 1934 MacRobertson Centenary Air Race from Mildenhall (near London) to Melbourne was divided into two divisions – speed and handicap – with no limits to aircraft size, power or crew. The sponsor, Australian confectionary mogul, Sir Macpherson Robertson, provided a prize pool of £15, 000. Initially, there were 64 entrants from 13 countries, but when the race started on 20 October 1934, the field had been reduced to 20 planes from seven countries. Only 11 finished the gruelling 18,000 kilometre trip.

The route stretched over 19 countries and seven seas. Five compulsory stops were designated for both divisions. Between the five stops (Baghdad, Allahabad, Singapore, Darwin and Charleville) pilots could select their own route.

Winners of the speed division of the race were British fliers C.W.A. Scott and T. Campbell Black in a red DeHavilland 88 Comet, named *Grosvenor House*. They reached Melbourne in two days, 23 hours, 18 seconds, with a total air time of 71 hours.

Winner of the handicap division, and second fastest with an air time of 81 hours 10 minutes, was the Dutch airliner *Uiver* (*Stork*). Crewed by Parmentier, Moll, Prins and Van Brugge and carrying three passengers, the Douglas DC2 was entered by KLM



http://www.sl.nsw.gov.au/discover_collections/history_nation/aviation/crossing_oceans/air/map.html

HISTORY TORQUES 1934

airlines and showed that passenger air travel could be comfortable, safe and reliable. *Uiver* suffered a near disaster when a the crew became lost in a storm over Albury, NSW. Residents, alerted by the local radio announcer, scrambled to bring their cars to the racecourse where rows of headlights guided the plane down to land. The next day it had to be dragged out of the mud to continue in the race to Melbourne.

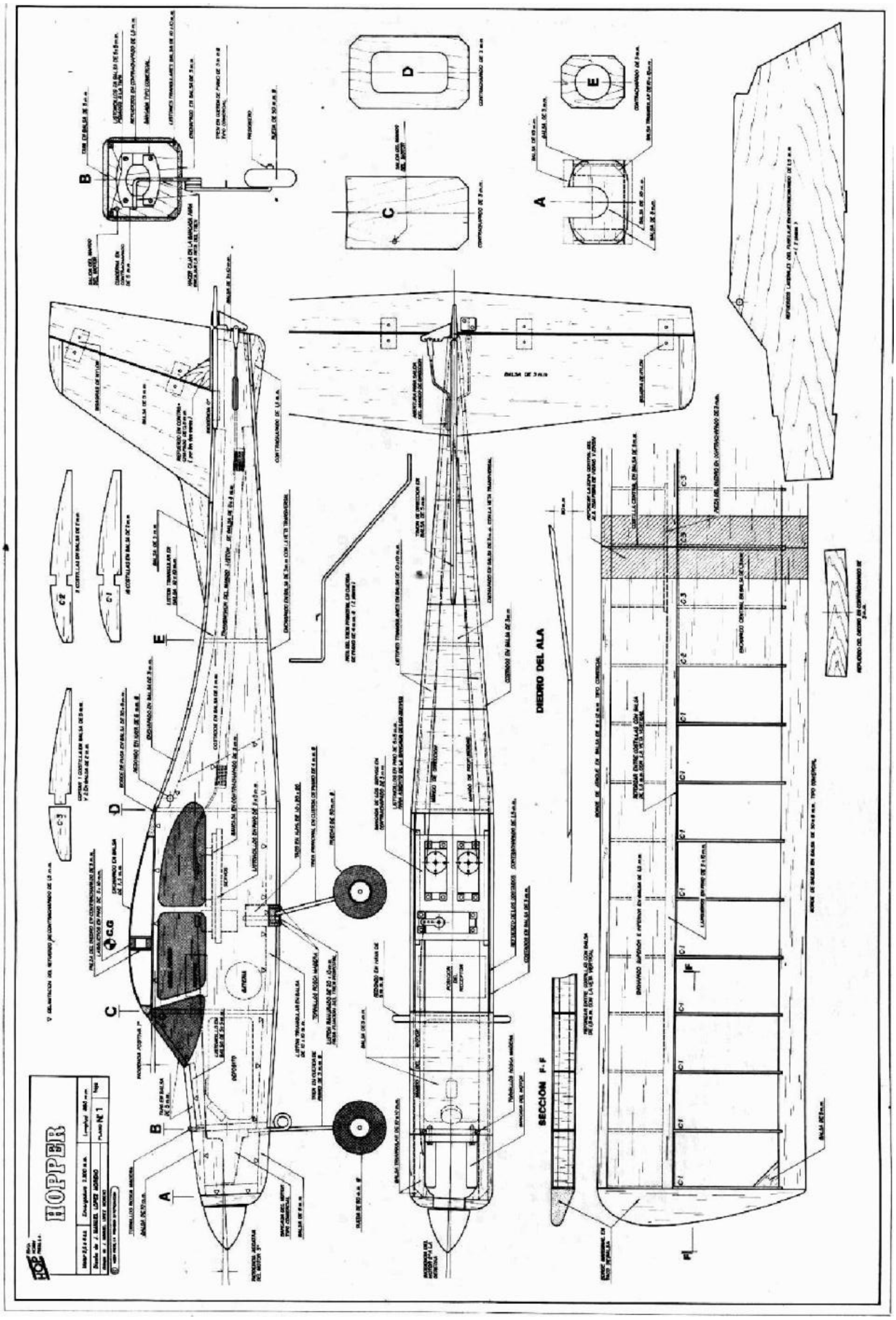
The only Australian to complete the race was C.J. (Jimmy) Melrose, who flew a DH 80A Puss Moth named *My Hildegarde*. After 120 hours flying time Melrose landed in Melbourne claiming second place in the handicap division.

Acclaimed aviator Charles Kingsford Smith did not compete, as he was unable to register his second-hand Lockheed Altair, *Lady Southern Cross*, in time to reach the start.

The MacRobertson Centenary Air Race signified the beginning of a new era in aviation. It proved that the new stressed metal aeroplanes performed better over long distances than wooden-bodied machines. It also proved that air travel was a viable alternative for international passenger transport, paving the way for aviation in international travel.

www.aarg.com.au/air-race.htm

PLAN TORQUE



http://www.svensons.com/airplanes/?f=Hooper/Hooper.jpg

FOR SALE & WANTED

For Sale

1/5 Scale Fokker DVII

OS 60 engine, Hitec radio gear
All reasonable offers considered.
Contact: Bryce 0417 127 945
bryce_atkinson(at)netspace.net.au

Zagi wing

OS25, Hitec radio gear.
Goes like stink!
All reasonable offers considered.
Contact: Bryce 0417 127 945
bryce_atkinson(at)netspace.net.au

One foamy Cessna package for sale!

All new never been flown, comes with the following:

- The Cessna has flap's, but they haven't been setup.
- All Electronics, Trans, Reciever
- 1 x Lipo battery.
- 1 x Turnigy battery charger.

Asking $125ono
Contact: Danny 0427 685 085

SUDUKO Solution

2	4	8	1	3	7	9	6	5
1	6	9	4	5	8	2	3	7
3	7	5	9	2	6	1	4	8
8	2	9	3	4	5	7	1	6
4	3	7	6	1	9	8	5	2
6	5	1	8	7	2	3	9	4
9	8	4	7	6	3	5	2	1
5	1	3	2	8	4	6	7	9
7	6	2	5	9	1	4	8	3

In case you are wondering Ed can't stand Sudukos. I put them in for some members whom like them

PUZZLING TORQUE

Hint :- They were both lost in the tragic accident

Charles Lindbergh

Amelia Earhart

Charles Lindbergh

SUDUKO

	4	8			7			5
1		6		5			3	7
			9	2	6	1		
8	2	9			5		1	
		7	6		9	8		
	5		8			3	9	4
			7	6	3			
5	1			8		6		9
7						4	8	