PLANE TALK GREENHORN CHAPTER 808 EAA

MEETING: SECOND WEDNESDAY EACH MONTH 7:15 PM, FREMONT COUNTY AIRPORT, East of Canon City, CO on Highway 50. ANNEX BUILDING #2. BREAKFAST EACH SUNDAY MORNING 9:00 AM SPITFIRE Grill at PUEBLO MEMORIAL AIRPORT TERMINAL BUILDING.

OFFICERS 2009-2010

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WEBPAGE ADDRESS: WWW.EAA808.0RG LOOK IT OVER!!!

Dues: **$15.00 a year**; due **June 1** of each year, **$20.00** if not received by **July 1st**. Mail to: Leonard Mino, 2013 Hesperus Dr. Pueblo West, CO 81007

Editors Rant:

Those members who are receiving this newsletter via US mail would help the chapter immensely by passing on your email address (when you get one) to the newsletter editor. Each mailed newsletter requires an envelope, paper, printer ink, postage and the time required to print, fold, and stuff envelopes then cart them off to the post office. Email on the other hand requires only a mouse click or two. The money associated with supplies and postage (about $13/member/year for 7 members) would be better employed funding chapter projects. Thanks!

Grant

Randy's Shop Notes

Hello friends and thank you for electing me as your chapter president! Jim Pinkerton has left some mighty big shoes to fill. I appreciate your vote of confidence, and welcome your suggestions as we begin a new year and a new page in this chapter's history.

Most of you already know my background from past meetings and hangar chat's. To sum it up briefly, my father inspired me to fly. From early childhood at his knee building balsa models from his RC and U-control models, I was hooked. We built a rogallo hang glider from popular mechanics magazine pictures while stationed at Aviano Air Base in Italy. Known as the crazy American birdmen, we flew the glider off gentle hills near the swiss alps. Returning to America, Dad retired and we built a Birdman TL-1A ultralight from a kit we bought for $400.00 in 1980. We both decided to get our pilots license as we completed the Birdman. We wanted to share the fun of flying so we restored a 1949 Aeronca Champ and the fun really began.

The chapter bylaws state that our primary mission is "to promote and encourage the sport and hobby of recreational aviation. " I would go further and say our mission is to share our passion for flight with each other and the community. That's the key: passion.

We all face many demands on our time and money. If we are passionate about an activity-if something is important to us- we make the time and money for it. In difficult economic periods, our aviation pursuits may seem like a luxury best deferred. But I would argue that an occasional indulgence, especially if it involves time in the air, feeds the spirit and soul to an extent far beyond the monetary cost.

Especially in times like these, we seek value in return for the resources that we devote to any one activity. For me, the value of our chapter is the chance to be immersed in all things aviation- to hang out with aviation-minded people, to participate in events like fly-outs and Young Eagles, Breakfasts, to learn new things via articles, seminars & speakers, and to talk flying even when we can't fly for reasons of weather, funds, personal or business.

To recruit new members and keep existing members engaged, we need to provide value. I will work with the chapter officers and board to strive for a mix of activities that appeal to all members.
To this end, I have committed myself to three goals that I believe will best enrich the chapter experience:
1. Re-energizing the chapter through improved meetings, programs, fly-outs, and other social activities.
2. Boosting membership to gain more of the resources and fresh ideas we need to succeed.
3. Increasing ties to the surrounding community in order to benefit both the chapter and the airport.

As stated, I also welcome your input in the direction of our chapter, Ultimately, this chapter is what we all make of it. Now is an ideal time to give some thought to who we are and where we're headed. So please let me or the other chapter officers know: What do you like about the chapter? What are you looking for? Are there areas that can be improved? We want to hear from you.

Jim's wife Genie, submitted the following for all you old time pilots out there.
A 65 year old man went to the doctor for a regular check-up and the doctor was amazed at what good shape the guy was in.
The doctor asked , "To what do you attribute your good health?"
The old timer said, " I'm a pilot. I'm up well before daylight, climb all over the aircraft doing a preflight inspection, fly all day, etc."
The doctor said, "Well, I'm sure that helps, but there's got to be more to it. How old was your dad when he died? "
The old timer said, "Who said my Dad's dead? "
The doctor said, "You mean your 65 years old and your dad's still alive? How old is he?"
The old timer said, " He's 84 yrs old and , in fact, he built and still flies his own airplane! He went flying with me this morning. that's why he's still alive!"

The Doctor said, "Well, that's great, but I'm sure there's more to it. How about your Dads dad? How old was he when he died?"
The old timer said, "Who said my grandpa's dead?"
The doctor said, "You mean your dad is 84 years old and his father is still living? How old is he?"
The old timer said, "Grandpa is 102 years old and he was a pilot too."
The doctor was getting frustrated at this point and said, "I guess he went flying with you this morning too?'
The old timer said, "No...Grandpa couldn't go this morning because he just got married and he's on his honeymoon."
The doctor said in amazement, "Got married?!! Why would a 102-year-old guy want to get married?"
The old timer said, "Who said he wanted to?"

Randy

JANUARY 2009 MINUTES

Call to Order 7:09 PM

Old Business/Previous Action Items:

I. NONE

New Business:

I. Treasurer Report — Leonard Mino
   a. $ 2235.47 balance in checkbook
   b. Christmas Dinner
      i. Costs: $1000.15
      ii. Income 760.00
   c. From Calendar sales
      i. 60.00

II. Date set for Young Eagles
   - Motion made & approved to hold the Young Eagles Event on June 6, 2009 (a week early due to scheduling conflicts with the Giffen's)

III. Hangar party/ chapter meeting
   To be held at Giffen hangar, in May

ADJOURNED 7:47 PM

Chapter entertainment program

In lieu of a guest speaker, several of the members provided items of interest:

- Randy White brought pictures of his SUPER CUB project .. Outstanding Randy!
- Jim Pinkerton brought pictures of a cedar strip canoe he's building.
- Fred Daams brought examples of his skill at woodcarving ,including a miniature glider trailer with a tiny carved replica of an ASW12. The real ASW12 had quite a history, it seems.

Other carved figurines show Fred's talents are extensive.

- Fred also passed out pictures of the Bleriot project showing the wings covered.

Quite a tribute to the varied skills of these chapter members !

Upcoming Events

Date	Event
03/11/09	EAA 808 Chapter Mtg.
03/21/09	Young Eagles Rally, EAA Chapter 540, Los Lunas, NM
04/08/09	EAA 808 Chapter Mtg.
4/21/09-4/26/09	Sun 'N Fun, Lakeland, FL
05/02/09	EAA 808 Blossom Festival Fly-in (Tentative)
5/TBD/09	EAA 808 Hangar Party/Chapter Mtg., Giffin Hanger
06/03/09	EAA B-17 Tour stop in Denver
06/10/09	EAA 808 Chapter Mtg.
06/11/09	Fly-in Pancake Breakfast, EAA 1267, Kremmling, CO
6/13/09-6/14/09	Blue Angels at the Front Range Airport
6/22/09-6/23/09	Rocky Mountain EAA Fly-in, Jeffco Airport
06/26/09	EAA 808 Young Eagles Rally
7/27/09-8/2/09	EAA Airventure, Oshkosh, WI

Tips 'N Tricks

This month we are presenting the 2nd of the 4 part series on airfoils by Chris Heintz of Zenith Aircraft. This presentation is available both from the EAA website and from http://www.exp-aircraft.com

About the author, Chris Heintz

Aeronautical engineer Chris Heintz, the designer of Zenith Aircraft Company's line of kit aircraft, is one of the most qualified and knowledgable light aircraft designers today. With prior experience from Aerospatiale, de Havilland, and Avions Robin (France), Heintz has designed and introduced more than 12 successful kit aircraft designs. Recently, the ZENITH CH 2000 design was put into production as a standard FAA type-certificated production aircraft.

Heintz regularly shares his design and construction expertise as a speaker to aviation groups and students of aeronautical engineering, and is a regular speaker at both the EAA Oshkosh and Sun'n

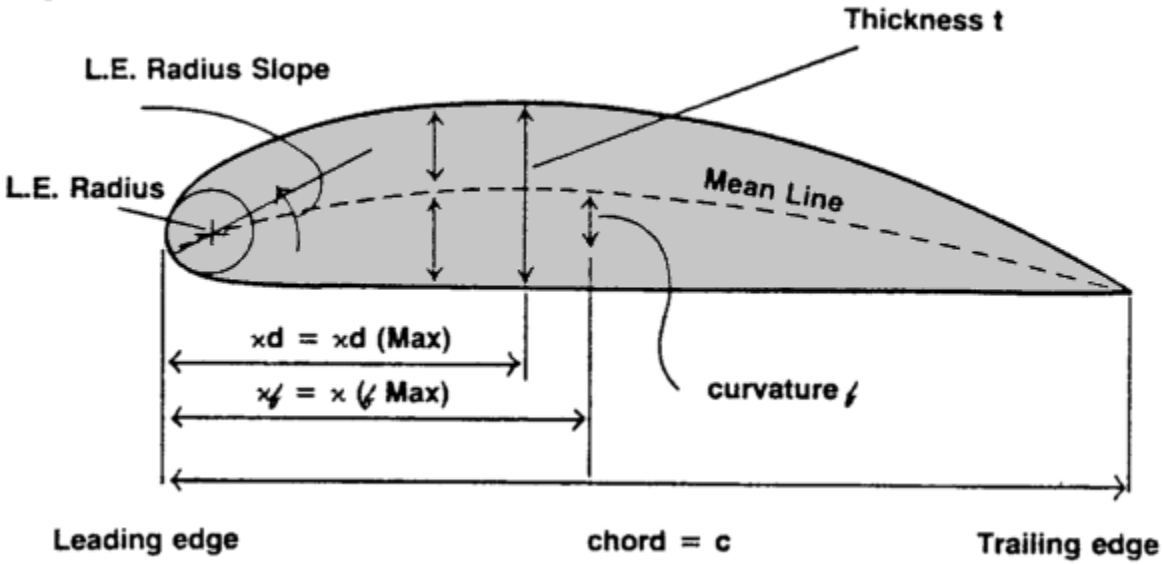
Fun fly-in conventions. An aeronautical engineer, Heintz has the unique ability of being able to simplify design concepts and to clearly explain and illustrate light aircraft design and construction.

Chris Heintz' articles were published in the Experimental Aircraft Association's (EAA) Light Plane World or Experimenter publications.

Part 2

In part 1, we discussed the significance of relative motion, Reynolds numbers and the Boundary Layer (laminar or turbulent). And there was some homework on basic airfoil design and geometry so that the reader should now be familiar with chord, leading edge. trailing edge, mean line curvature, thickness etc., as shown in Figure 1.

Figure 1



As this discussion is limited to airfoils used on light planes, we will ask ourselves: What are the most significant features we would like to achieve with our airfoils?

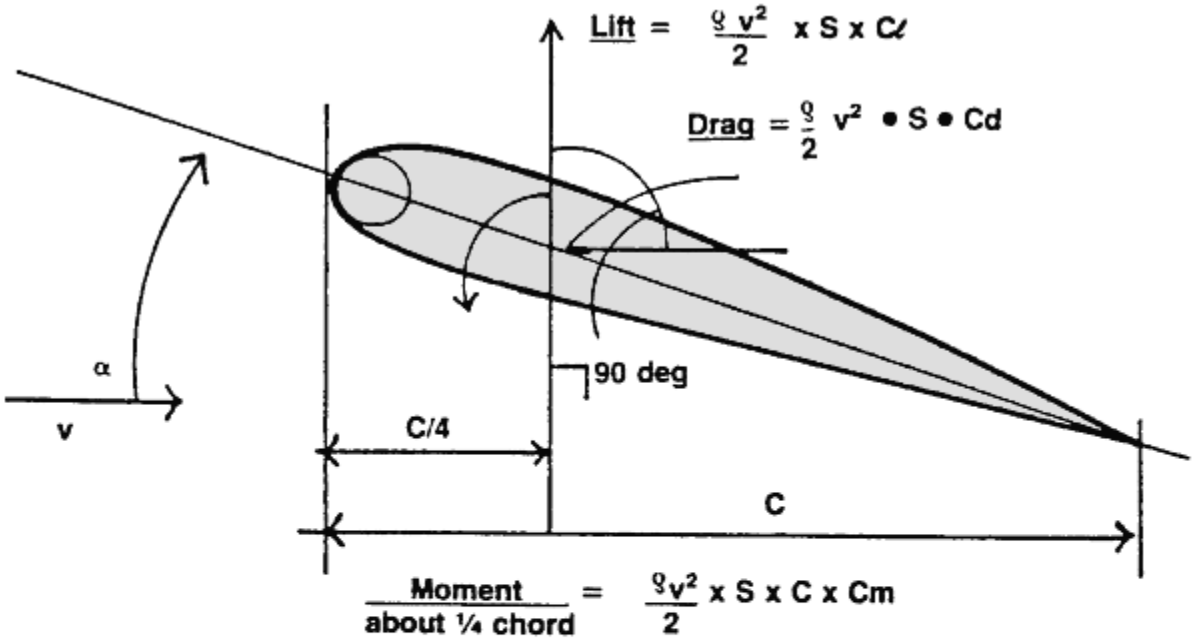
1. We want to fly as quickly as possible (short take-off), thus need *high lift* at low speed.
2. We want to have *full control* of the aircraft as soon as airborne and throughout the whole speed range.
3. For a given thrust (engine horsepower, intake, exhaust and propeller) we want a high cruise speed, thus need *low drag* at high speed.
4. In all configurations we want a strong airframe without undue weight - thus we need a *thick airfoil* to be able to use a deep spar and have a large "torque tube" which will give bending strength and stiffness as well as torsional strength and rigidity.
5. We also want good climb characteristics which means *high lift and low drag in*

the climb attitude - with good engine cooling and a light airframe to be able to use full power and climb at slow speed with a high rate of climb (steep climb).

As already obvious from the above listing. there will be some compromising in the selection of the airfoil - but the airfoil is only one parameter. Others are wing planform (rectangular, tapered, etc.), wing tips, wing twist (we will discuss this topic, as it seems to be one that is frequently misunderstood or underestimated), wing aspect ratio, or span loading (which seems to be overestimated).

Over the years, it is very interesting to follow the designs of aircraft that are popular - there is a fashion in aircraft just as there is in clothing - pants, long skirts. mini skirts - racy looking aircraft, old fashion classics. new looks, etc.

Figure 2



(by definition Cm is negative when giving a nose down patching moment)

$\frac{Sv^2}{2}$ = dynamic pressure = $\frac{\text{density x (speed)}^2}{2}$ =

$\left(\frac{\text{vbm/h}}{14.4}\right)^2 = \left(\text{v mph}\right)^2$

where
s = area of airfoil section = C x Δ b = chord x portion of span/C = chord

The Force on an Airfoil

But let us look today at following basic airfoil requirements and later on see how we have to design the wing so that the same requirements can be further improved upon (or at least not lost!).

We'll consider:

- High Lift
- low drag
- Strong and stiff structure

With classic airfoils, those used over the last 30 to 50 years, we have accustomed to a maximum lift coefficient of 1.4 to 1.5 with a 12 to 15% thick (d/e) airfoil and a drag coefficient of .01 in cruise configuration (ie. NACA 4412, NACA 22012 and NACA 23012 or 23015). All of these airfoils are relatively insensitive to roughness (dirt or manufacturing imperfection) on the leading edge and except for the 4412 or 4415, their moment coefficient is relatively low so that the wing is not submitted to very large torsion at high speed (large $Sv^2/2$ - see forces on an airfoil).

To increase the maximum lift, traditionally an appreciable increase in the camber is quite effective. Practically, this is done by deflecting the rear part the airfoil with so-called flaps (or ailerons, elevator or rudder).

It is also known that this substantial curvature increase is associated with a large Cm equivalent to .067 S flap (deg.) To avoid designing the whole aircraft for this condition the designer limits the "flap out" speed (V_F) to a reasonable useful range.

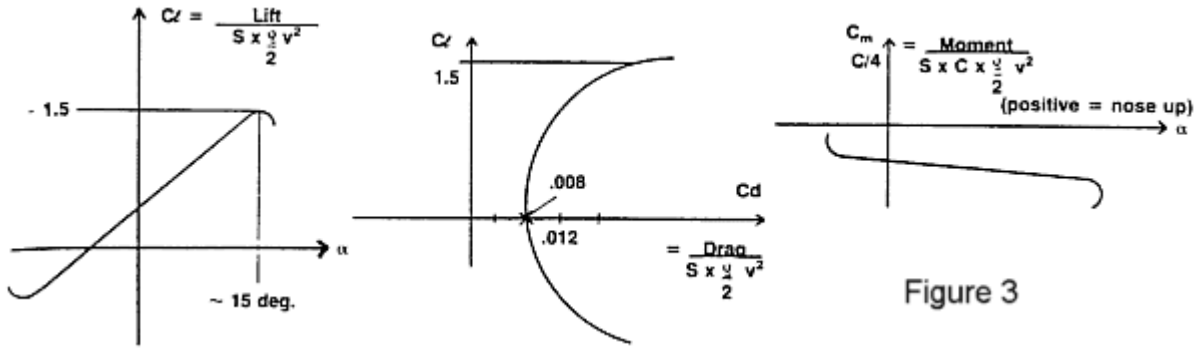
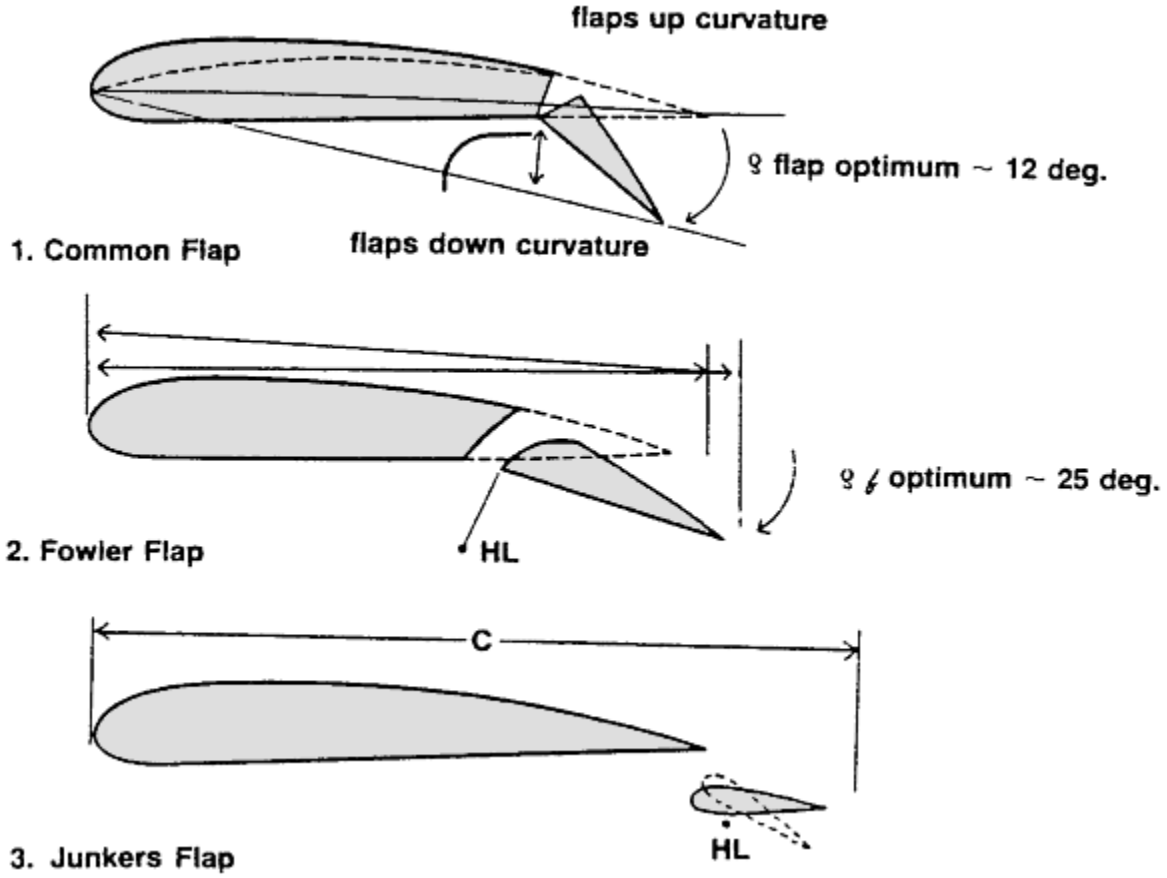


Figure 3

Unless relatively complicated to build, when flaps (see next paragraph) are used, the increase in lift is moderate: to a $CL_{MAX} = 2.2$, at Sf equivalent to 15 degrees. (This is a profile value - the whole wing which usually has only 1/2 span with flaps, has a CL_{MAX} equivalent 1.9) and because the flaps are stalled on the upper surface (because the airstream has not enough momentum to overcome a sharp change of direction - due to an already thick boundary layer), the drag increase becomes quite substantial with Sf larger than 15 degrees and there is no improvement in the climb speed range.

This drawback of the "plain" flap is partially overcome with the more sophisticated "Fowler" flap, where a gap is created in such a way that, when deflected, air from underneath is caught in a "funnel," accelerated and "blown" into the boundary layer at the upper surface, thus allowing the airflow to follow the flap contour to deflections up to 25 degrees approximate.



Usually the Fowler flaps are not only deflected but also moved rearwards (with a hinge point situated below the airfoil or a sophisticated track system as on the Cessna 152 and 172, etc.), which increases the wing area S by increasing the chord.

When homebuilders install this kind of flaps it is very important that they stick to the designer's geometry because the flap nose position with respect to the wing rear end is very critical to obtain maximum profile lift coefficient of up to 2.6 (see NACA Rep. No. 664 - 1939)

Split flaps, although quite effective, have fallen out of fashion and will not be discussed further [though I have re-introduced them with the ZENITH CH 2000].

A very interesting flap is the "Junker" type. It is a separate small airfoil under the wing trailing edge and hinged in such a way as to always create the "funnel effect" to

reactivate the upper surface boundary-layer.

The Junker flap is especially interesting when used as ailerons (the ailerons are flap sections on the outboard wing panels, one being deflected down, the other up, so that the pilot has "roll control" over the aircraft.) As already mentioned the usual boundary layer is quite thick over the rear part of the airfoil and the ailerons need a certain minimum deflection to be effective. This is usually small "ineffective" roll control deflection from its neutral position. With the Junker type aileron, this is not the case if full advantage of the possible "funnel effect" is achieved by *careful design of* the hinge point location and *careful construction.*

The drawback of this flap is that at high speed the funnel is always consuming some energy so that the drag coefficient is slightly higher than for a conventional flap.

But the 'Junker' flap is a very good compromise when excellent low speed in aileron controllability is desired, associated with high lift/low drag in climb configuration, and the top speed end is not so important. [That is why I chose the Junker flaperon for my STOL CH 701 design].

The 'Junker' flap always, and the 'Fowler' flap when extended, provide a certain 'boundary layer' control, be cause they 'trim" this layer out by blowing accelerated air into it, thus allowing the airflow to adhere to the solid airfoil up to substantial deflections (30 to 45 degrees) without local stalling of the airflow.