No. 152 FEBRUARY 1999

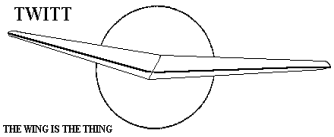
T.W.I.T.T. NEWSLETTER

Alphagrif is an advanced flying wing design by Bill Hinote. It embodies the latest in materials and aerodynamic technologies to create an ultra-efficient airframe. For more information, see page 8 inside.

T.W.I.T.T.
The Wing Is The Thing
P.O. Box 20430
El Cajon, CA 92021

The number after your name indicates the ending year and month of your current subscription, i.e., **9902** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, March 20, 1999, beginning at 1:30 pm at hanger A-4, Gillespie Field, El Cajon, CA (first hanger row on Joe Crosson Drive - Southeast side of Gillespie).



THE WING IS THE THING
(T.W.I.T.T.)

T.W.I.T.T. is a non-profit organization whose membership seeks to promote the research and development of flying wings and other tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis. T.W.I.T.T. is affiliated with The Hunsaker Foundation which is dedicated to furthering education and research in a variety of disciplines.

T.W.I.T.T. Officers:

President: Andy Kecskes	**(619) 589-1898**
Vice Pres: Bob Chase	**(818) 336-5485**
Secretary: Phillip Burgers	**(619) 563-5465**
Treasurer: Bob Fronius	**(619) 224-1497**
Editor: Andy Kecskes	

The **T.W.I.T.T.** office is located at:
Hanger A-4, Gillespie Field, El Cajon, California.
Mailing address: P.O. Box 20430
El Cajon, CA 92021

(619) 596-2518 (10am-5:30pm, PST)
(619) 224-1497 (after 7pm, PST)
E-Mail: twitt@home.com
Internet: www.members.home.net/twitt

Subscription Rates: $20 per year (US)
$25 per year (Foreign)

Information Packages: $3.00 ($4 foreign)
(includes one newsletter)

Single Issues of Newsletter: $1 each (US) PP
Multiple Back Issues of the newsletter:
$0.75 ea + bulk postage

Foreign mailings: $0.75 each plus postage

Wt/#Issues	FRG	AUSTRALIA	AFRICA
1oz/1	1.00	1.00	1.00
12oz/12	5.00	6.75	5.00
24oz/24	9.00	12.25	9.00
36oz/36	14.00	19.50	14.00
48oz/48	16.75	23.00	16.75
60oz/60	21.75	30.25	21.75

Meetings are held on the third Saturday of every other month (beginning with January), at 1:30 PM, at Hanger A-4, Gillespie Field, El Cajon, California (first row of hangers on the south end of Joe Crosson Drive, east side of Gillespie).

TABLE OF CONTENTS

PRESIDENT'S CORNER

I don't know about the rest of you, but I hope your health has stayed better than mine over the past week or so. This cold and flu thing has gone through my office and home, and I finally succumbed to it this weekend right in the middle of producing the newsletter. I'm on the mend now, but you should hear all the hacking and such in the spaces outside my office. It makes we want to go on a trip to make sure I don't get it again.

For those you how haven't looked at the web site in a few weeks, take a few minutes to go through the NEW stuff. If you don't have the capability at home, try you local library. Most now have time share computers with access to the internet and there are also many free e-mail services available for those who don't need a lot of capability but would like to communicate electronically.

I have received some very positive feedback on the structure of the web site and will be making a number of formatting changes in the weeks ahead (now that the newsletter is in the mail). I am also always looking for more material that is uniquely TWITT to include in the pages. If you know of any good links that we need to include so others can find pages with pertinent information of flying wings, design techniques, etc., please get them to me. I have a bunch to add that I picked up in the past several weeks, so make sure to revisit the site later in the month.

We are also looking for new programs for the meetings. Bob has just about run out of ideas and friends to tap for such occasions and we could use all the help we can get. So if you know of anyone in the Southern California area that could give a 45 minute to one hour presentation on a relevant subject please let us know.

Andy

MARCH 20, 1999 PROGRAM

As we went to print for this month, we were working on confirming an most interesting program for March. However, until we get the final commitment from the speaker we don't want to speak out of turn. If everything works out, we know you will really enjoy it, so mark your calendars now so you won't miss it.

MINUTES OF THE JANUARY 16, 1999 MEETING

Andy opened the meeting by welcoming everyone to a warm, sunny Southern California day, unlike the miserable, cold weather being suffered by those in the mid-west and eastern parts of the country. He started with a round-robin since there were some new faces in the audience and it would give our speaker a chance to learn about the people he would be talking to today.

After the introductions, Andy mentioned that one of the original founders of TWITT, Richard Miller, had been contacted by Larry Witherspoon, a long time TWITT member who had known Richard from years ago. This new contact resulted in Richard and Larry discussing the theory of aerodynamic lift which has led to over 24 pages of material. Richard then came up with a condensed version which has been added to the TWITT web site so it can be read and commented on in an effort to refine the theory. This information has also been passed along to the Nurflugel chat board group to see if they wanted to also get involved. Hopefully, there would be enough interested generated to get some new members for TWITT as well as produce a healthy dialog for Richard to refine his theory.

With all that out of the way, Andy introduced Rik Keller, a member of EAA Chapter 14 (San Diego), who was going to tell us about his methods of using an Excel spreadsheet for calculating stall speed and efficiency factors for homebuilt projects.

Rik opened by saying his program would be comprised of two phases. The first will be a review of the spreadsheet he has developed for the column he writes for the EAA Chapter, titled "Computer Corner." The second part would be his thoughts about what TWITT really means and is the wing really the thing or are there other things that are just as important.

A couple of years ago he started writing some articles for the chapter newsletter to add some technical material to it that seemed to be lacking. He wrote about people building airplanes and this led him into his current series of articles on making aerodynamics more understandable to the average builder. It was meant to sort of replace those big thick aerodynamics books with something that was easy to use and produced information of value to the builder.

His spreadsheet is a continuing project, but he went over what he has at this point which requires some simple inputs by the builder, things that can be easily measured. The spreadsheet would then calculate the resultant aircraft performance. Does it fit all airplanes? No, since he has made some assumptions, again to make it easy to use. You won't find anything about Reynolds numbers because it is not particularly relevant to the types of aircraft these people would be building. But it will give the user a good idea as a starting point in the design and building phases.

His demonstration spreadsheet uses a Thorpe T-18 as an example, since Rik had a lot of experience building one a number of years ago and is familiar with the dimensions. The sheet is set up for the user to input known data in one column and have the program calculate the designed numbers in another column. Someone asked him one time what weight to put in the field and he said any weight you want since the spreadsheet will adjust all the rest of the numbers automatically.

(ed. - For those of you not familiar with electronic spreadsheets, they provide a means of performing complex mathematical calculations by using information from individual cells. By inputting numbers like weight, length, width, span, etc., these factors are fed into the formulas and things like aspect ratio and wing area are produced. When you change any of the information in a cell that provides data for the formula, the formula automatically recalculates the answer based on the new information. If you know the structure of the formulas, this is a much better method for producing a input/output system than trying to write a computer program.)

For Rik's spreadsheet he asks the user to input information in units like feet and inches and lets the formulas calculate the numbers into decimal values for use in the other formulas. Again, he made it easy for the user and let the computer do the hard work. The first area asks for data on the wing and flaps, like chord and span so it can calculate the effective span and aspect ratio. Then you put in the wing planform, elliptical, rectangular or tapered and this produces the Oswald Efficiency Factor for the wing. It goes on asking for the fuselage frontal area and shape and, the program goes about giving back the total airplane efficiency factor, wing area and, wing loading. (You can see the rest of the input/output data on the sample included here.)

One of the things that Rik mentioned was the way in which aerodynamicists look at a wing, the whole wing. However, this doesn't take the fuselage into consideration and Rik indicated text books he has researched basically say to ignore the fuselage for wing calculation purposes. So Rik's spreadsheet just takes into account the full span and chord then uses the traditional formulas. Bruce Carmichael said that this generally works well enough for the types of applications used by home builders.

The next stage in the spreadsheet covers efficiency factors, like the Oswald factor and one called the "e" factor that is for the whole airplane. Through use of the internet he found some of the regression analysis programs he needed to compute the values presented in efficiency charts from the aerodynamics books. This is where the wing planform comes in, so he set up an input value for rectangular, elliptical or tapered that could be used by the program functions to figure the efficiency factor (e_w). The fuselage shape is then input and its efficiency factor calculated so it can be combined with that of the wing and the results yield the total aircraft efficiency factor.

This total factor is needed since it represents how the wind sees the wing. If you look in the upper right hand corner of the spreadsheet, this is were the efficiency factors are applied to the wing dimensions, resulting in the effective chord and span. So, the wing chord may be 4.17', but the wind sees it as 4.83' which is better, but it only sees the effective wing span as 17.98' versus the real 20.83' which is worse. These become the values the remaining calculations use since they are directly related to how the airplane is flying through the air, not its static dimensions.

The spreadsheet then produces the values for wing area and wing loading, which are then used for computing the stall speed. This can be roughly figured by taking the square root of the wing loading and multiplying it by 16, but the spreadsheet does it a little more precisely based on the efficiency factor values.

Line 9 is for inputting the altitude, since many of the values computed later in the program will vary based on air density. There will eventually be other numbers and charts developed as part of the program which will also use these numbers along with the coefficient of lift in various configurations. Rik did note that if you couldn't locate values for C_l , the ones already coded on the spreadsheet would be pretty good starting points for most types of wings used by the home builder.

The spreadsheet's next area has to do with horsepower and propeller efficiency. Everyone usually knows the horsepower they have or plan to put in the aircraft, but this program allows you find out what would happen if you increased the horsepower. You might just find the speed gained is not worth the fuel burned due to the efficiency factor of the airplane itself. This can be seen in lines 15 and 15a. He used .8 for propeller efficiency which is a common number, but if you have proof your propeller is better or worse, that would be the number you would want to use.

In order for the remainder of the program to work, you need to know what the drag area of the plane will be. Rik kind of takes a simple approach here by taking the thrust horsepower and combining it with the maximum speed of the aircraft to produce the drag area. The only thing it won't do is let you compute a top speed by backing in some of the other numbers, so the program is not useful in that context.

From drag area it moves on through the zero lift coefficient, the effective span loading and minimum sink values that will finish out the bottom of the spreadsheet. The sink speed allows you to find how much horsepower is necessary to maintain level flight, in this case 39.43 hp at 78.2 mph. What amazed Rik was that this relatively high drag aircraft could fly on that little horsepower. This data also helps calculate the fuel burn rate and miles per gallon which can be compared to other types of aircraft.

He noted that the reason for the dotted pattern on the upper portion of the sheet and the lines at the bottom had to do with the continuing development of the program. As he has covered a new area on the spreadsheet in one of his columns, he changes to the dotted background to help the reader focus on the new material.

For those of you who are interested in downloading this and other spreadsheets Rik has developed over the years, you can find them at the following web site:

http://www.eaa14.org/news/ccnews.htm

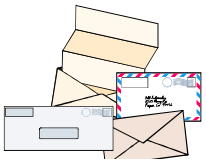
In the next part of Rik's program he planned on trying to identify if the wing was really the thing or if there were other more important factors when designing an aircraft. To do this he envisioned a flight and began breaking it down into the various components. He started with the climb which requires a certain amount of excess horsepower and, how fast you can climb at that power and weight combination. So maybe power is the thing (PITT). Or maybe weight is the thing (WITT). Induced drag also has an impact on the rate of climb, so maybe induced drag is the thing (IDITT). He commented that the Oswald efficiency factor for an elliptical wing like that of a Spitefire is about 1, where a rectangular wing might be on the order of .7 or .8. He had heard there was a group in Switzerland had been working on a wing tip based on the vulture that had the potential to get the Oswald factor to about 3.0. Then there is the effect of span loading on the rate of climb, so now you have SLITT (like maybe one of those things on the leading edge of a wing).

The airplane efficiency factor has an impact on both the climb and cruise capabilities, so maybe it is AEFITT. For the wing itself there is the Oswald efficiency factor, so maybe you have an OEFITT. (ed. - Some asked who was Oswald? Dr. W. Baily Oswald was a world famous applied aerodynamicist and an AIAA Fellow. He developed a correction factor in the Prandtl theoretical ideal induced-drag equation to account for the deviation of lift distribution from the ideal elliptical shape, the increase in parasite drag with lift coefficient, and the change in drag with lift of any other parts of the airplane, such as the tail or nacelles. Hence, the Oswald factor. For many years he was the chief aerodynamicist for the Douglas Aircraft Company. Dr. Oswald died in Los Angeles, CA on July 30, 1998.) Rik noted that as wing area goes up there will be a higher percentage of the drag created by the wing, and as your max speed goes up it does so as a cube of the wing loading, and as the horsepower goes up the wing is contribution less drag as a percentage of the total aircraft drag.

To illustrate this point, he said that on a Cessna 150 the wing is only 16% of the total drag, whereas, on a Lancair 4, which goes fast on not much horsepower, the wing drag is 37%. On Rik's Terra II ultralight with a big wing, the wing drag is only 11% because everything else on the airplane is high drag. So, Rik surmises, the wing really may not be the thing since it doesn't contribute that much as a percentage to the total drag component.

On the descent phase of flight the L/D and sink rate become key factors, and on landing you want to have a very low stall speed. To do this you either need a large wing area or a low weight. So maybe wing loading/area is the thing (WLITT). You would also like to have a high coefficient of lift, so people spend a lot of time putting on lift enhancing devices, like flaps, slats, etc.

Rik's final comment was that when you take into account all of the considerations above, perhaps everything is the thing (ETITT).



LETTERS TO THE EDITOR

12/1/98

TWITT:

Enclosed are a couple of items that might be of interest to other TWITTs. The first is an article from the Smithsonian Air & Space Society's newsletter that describes the restoration work currently underway in Germany on the Horten gliders. The National Air and Space Museum owns pieces of five Hortens and the Deutsches Teknikmuseum will restore them in return for being able to keep one.

The other items are pages from the catalog of the Squadron Shops model supply company. Among other things, they have a number of plastic models of flying wing aircraft. I have copied several pages that include models of the XB-35, multiple variants of the ME-163 and, other experimental German designs. Squadron is a good place to shop for models of unusual aircraft from around the world.

Hope everyone has a happy holiday season.

Kevin Renshaw
Fort Worth, TX

(ed. - Thanks for all the material. The Smithsonian article was written by Russ Lee who has contributed items to TWITT over the years and is an occasional contributor to the Nurflugel chat board run by Doug Bullard.

According to the article, a Horten II L, IIIf, IIIh and a VI-V2 were shipped to Berlin for restoration. The Horten II L will become the property of the museum as their payback for the restoration work. The museum expects to finish all the gliders by 2001, and the aircraft returned to the NASM will eventually be displayed at the Dulles Center. If you are interested in seeing what else is going on at the NASM, check out their web site at: http://www.nasm.si.edu.

The pages from Squadron Mail Order contain models like the Horten Ho 229A-1 & 229 V7, the DFS 194, Northrop N-9Ma, Sack AS-6V1 flying saucer, BV P 212-03 & BV P 215-02 and, Lippisch Li DM1. For more information they can be contacted at: 1115 Crowley Drive, Carrollton, TX 75011-5010, (972) 242-8663, mailorder@squadron.com, and through their web site at: http://www.squardron.com.)

1/2/99

TWITT:

I would like to subscribe to your newsletter (please see enclosed check for $20). I have been fascinated with the Horten flying wings ever since an undergraduate student team I was on in college did a theoretical performance analysis study of a modestly up-engined Ho-229. The simple calculations showed remarkable rate-of-climb, load carrying ability and, range even by today's standards. A background search through the Texas A&M Library returned a number of 1940's era aviation journal articles and US government reports. Does your organization have an archive?

If you have an index to articles which have appeared in your newsletter, I would love to see it as I am interested in obtaining back issues related to the Horten flying wings.

Yours truly,

Mark D. Cowan
4 Varner Drive
West Columbia, TX 77486

(ed. - Thanks for your membership subscription. This will be your first issue of the newsletter and we hope you enjoy it, even though it doesn't deal with anything about Horten's aircraft.

Unfortunately, at this time we do not have an index of the articles in the newsletter. Now that I have the web page up and running, I guess that will have to be the next priority project due to the volume of information included in them over the years.

I will ask our archivist, Gavin, if he can come up with some of the better issues with Horten information and then let you know what we have for you and it's cost. This may take several weeks, so please be patient since this is strictly a volunteer effort by all of us.

If you still have access to the information from you undergraduate work, it would be interesting to see what you did and the actual results. Our members are always looking for anything that confirms their faith in what the Horten brothers did over the years.

Again, welcome to TWITT.)

1/6 & 1/8/99

TWITT:

I would like to attend the next meeting of TWITT. Would you be kind enough to provide the when and were and/or contact number. I am highly interested in joining.

I have been reading everything on the web relating to flying wings the last few months. Currently I am having some interesting experiences with plans for a Mitchell wing (will discuss with anyone who cares...).

I am also seeking help with wing twist and control setup for an original design. I am one of those crazy people who build aircraft and then fly them. It's a great education.

(ed. - I sent the meeting information and received the following message back.)

Thank you for the information on your next meeting. Looks like we have plenty of time to plan on getting there. Have no problem finding Gillespie field, will just need to which hanger. I live in the North County.

Mister Avalon seems to be very helpful when last time we conversed about the U-2. Perhaps my last e-mail convinced him about my insanity as I asked some questions about the plans he sells. Now, if he were to show up, that would be something, but as he lives in the San Francisco bay area, it's not likely. Will have to give him a call again.

While I really like the U-2, I want something stall/spin resistant, or at least with good recovery abilities. One of my friends tells me about all the bad characteristics of the Mitchell wing, but can't provide the details.

I have another friend who flies a Kasper wing and just loves it. It has great soaring capacity but not much penetration. Wiltold Kasper was on to something.

Then again, I am fascinated by the aerobatic capabilities of the Horten gliders. Does anyone have a flying wing that can do that?

To get what I want it looks like self design is the most likely option. Perhaps there are some there who are willing to discuss what will make a wing maneuverable, aerobatic, and safe. Not that I am big on aerobatics, just think that any aircraft capable of stalls, loops, rolls, spins, and hammerheads is probably a safe aircraft.

Be talking to you soon.

Morgan Detton
Vista, CA

(ed. - Morgan attended the January meeting and has become a member. Welcome.)

1/12/99

TWITT:

All the best for the New Year and thank you very much for your interesting newsletter on which you have much work and sometimes a little trouble! I have enclosed my renewal subscription for 1999.

I hope to send you my new book “Flying Wings” which will appear in the summer of this year by publishing house Heel-Verlag, but unfortunately first only in German. Flying wing literature will be coming this year like flowers in the spring(!) with the book from Mr. Belletier and Mr. Vigneron in France. A pleasant outlook for our TWITT friends.

With best regards.

Rudolf Storch, Dip. Ing.
Deisenhofen, Germany

(ed. - Thank you for the renewal and kind words about the newsletter. Sometimes it takes a lot to put one together and other times it almost seems to get done on its own. Lately there has been just enough to keep going, and with what's been happening on the Nurflugel chat board, there is always something to use to fill in any holes.

We look forward to receiving your new book, even if it is in German. I am sure we will have some members passing through the hanger that will be able to read all or parts of it. If we find something really intriguing we can always ask you for a short explanation or get someone to translate a small portion.

We hope you have a happy new year in 1999 and find out about more interesting things on flying wings throughout the year.)

1/8/99

TWITT:

Enclosed is my subscription to TWITT, from January to December 1999.

In the October 1998 newsletter (page 6) that I received as an information pack, I notice Kevin Renshaw sent you some interesting material:

‘The Monarch’ by Jim Marske, Soaring
‘Flying the Pioneer II’, Soaring, July ‘74 pp. 22-25

I’d like to know if it is possible to get a copy of both articles. Tell me what’s your price and I will send you the dollars..

I’m building a web site about the Fauvel tailless gliders. I hope it will be finished in a few weeks, but I’m rather busy. It deals with Charles Fauvel’s life, his gliders, how they were designed and, other flying plank designs (such as the Marske Pioneer). Sorry, it will be in French only, but I may include an English digest.

Sincerely,

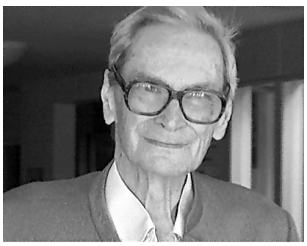
Christophe Bordeaux
32 Route de Vaucelas
91580 ETRECHY
FRANCE
Bordeaux@citeweb.net

(ed. - Welcome to TWITT. By the time you receive this newsletter, your material should be in the mail. We look forward to viewing your web site when it comes on-line, even if it is in French. I guess I will have to try and get my daughter to do a little translating for me.

I would also like to thank you for your e-mail comments on our web site. I am always seeking to find better ways to present material and learn just what others see when they display it. You would think it would be all the same, but after pulling it up in Internet Explorer, I can see that is not the case. I will be making some changes to the format in the near future that I hope will correct some of the problems you noted.)

DEDICATION TO WALTER HORTEN

November 13, 1913 - December 9, 1998



(Photos of Walter Horten as a fighter pilot of the Reichsluftwaffe and shortly before his death. Source: Ronald Schmidt, 1998)

Flying wing promoter and sponsor, and enthusiastic fighter pilot

Suffering a heart attack on December 9th, Lieutenant Colonel Walter Horten left behind not only his family, but also a recently growing family of friends of the flying wing, the purest aircraft in design and build. But besides this main reason, for which we honor him honestly today, he also felt strongly as a fighter pilot, who knew how to achieve victories and how to survive. This latter characteristic of his life built the basis of the very successful flying wing aircraft family, spreading the name Horten all over the world.

The pure wing, no fuselage, no tail

Since 1928, together with his two brothers Wolfram, the elder, and Reimar, the younger, he was involved in the design, development, and evaluation of the flying wing, the purest aircraft that ever will fly. They started with models. Between 1933 and 35, they built the first two of their man-carrying designs, the Horten H I and H II in the living rooms of their parent's house in Bonn, Germany. With the H II, they found their own way in design, characteristics, and shape in conception as well as in flight, that can be found in all further planes they developed and built. In this way, the twin-jet engine H IX best represents this goal and challenge: no remainder of a fuselage body to hide the undercarriage and no tail and fin. Only three small bumps protrude over the clean surface: for the canopy and the two jet exhausts.

Organizational safety - Walter's extraordinary merit

Where Reimar contributed the greater part of all necessary techniques, Walter was in charge of the organizational safety, and thus made it all possible. As technical officer of the famous Fighter Squadron JG 26 "Schlageter", Walter Horten was involved in establishing the Sonderkommando L.In.3, later named Luftwaffen-kommando IX, which was the organizational basis of the Horten design and construction activities during the entire war.

In-between all the administrational bodies and branches in the Luftwaffe, this L.In.3 and L.Kdo.IX existed aside from those tightly organized structures, but still remained an official unit to get enough money to pay for the development expanses of: the high performance gliders H IV and H VI, the derivations of the H III as (still today most modern) motorgliders and also used to test the unusual prone-position for the pilot in the H IIIf in comparison to the conventional cockpit design for the same aerodynamical behavior; the twin engined H Vb; H Vc, and; the H VII. The good relations of Walter to the heads of the Luftwaffe surely helped them to get the order to develop the twin-jet Horten H IX in 1944 and 45.

Between all the official work, i.e. working for the background organization and maintenance for his squadron JG 26, Walter found the time to accompany very closely the developments of his brother and their technical process. He was especially focused on the flight handling characteristics and later in the war the compatibility of the planes to the military requirements that were necessary to fulfill their dream, the pure wing without any disturbing add-ons as tail and fuselage-body. And during all these hectic months during the war, Walter found the time to fly himself the airplanes of his brother and the design and construction team, to give high value advices to the planes' evaluation, or to give them aero-tows for test-flights.

As the most active pilot of the three brothers, he gave the inputs to the flight handling characteristics, from the time of development of the Horten IX, the twin-jet flying wing combat aircraft, to the end of the WW II. (Wolfram later also became a pilot, but lost his life during a mission in June 1940, while flying a Heinkel He 111 for the German Navy.)

After the war

While his brother Reimar went to Argentina to realize further flying wing designs, Walter as soon as possible took the chance to go into the growing organization that formed the new Luftwaffe. But his dream forced him to try flying designs also in Germany. With his friend Alfons Puetzer, who worked with him before and during the war, he redesigned their early model H III d/e to form the Horten Ho 33 two-seater motorglider, which was built in the Puetzer-factories in Bonn. But this machine was too huge in its dimensions to meet the market-requirements in these poor aviation years in Germany in the 50's. So they built two machines only.

In 1978, he retired from the German Luftwaffe. Not always good in health, he followed with great interests the development of flying wings all over the world, he especially appreciated the growing interests in the elder Horten-designs as much as the latest developments with help of his brother Reimar in the 80's and early 90's. The unexpected death of Reimar in 1993 worsened his difficult health-situation.

September 24th, 1994 arose as a special day for Walter Horten: This day, the world-wide Society of Experimental Test Pilots honored him as a Honorary Fellow in a ceremony in Los Angeles. It was a great pity that Walter's health-condition didn't allow him to attend this great honor for him, because the members of the SETP all have the highest level in experimental test flying of the world. So they gave an official proof of the merits Walter earned in the development and flight evaluation of flying wings in the pre war time and during WW II.

So the close Horten family as the enthusiasts for the Horten pure flying wing designs also lost one of their greatest promoters in the world wide flying wing scene. We will honor him in the still alive Horten designs all over the world.

Peter F. Selinger

NORTHROP TEST PILOT PASSES ON

From Al Bowers, NASA Dryden Flight Research Center.

Max Stanley, Northrop test pilot of the N-9M, XB-35 and YB-49, died Saturday, January 23, 1999, at his Brentwood, CA home. He was 89 years old. Stanley was the first pilot of the XB-35 on June 25, 1946. Stanley spent much time recounting how the Northrop flying wings were his favorite aircraft to fly, writing many letters to that effect. Late in his life he was a avid supporter of the B-2 flying wing program. Stanley was also a founding member of the Society of Experimental Test Pilots (SETP). Gentlemen, we are seeing history pass before us....

Alphagrif

An Aircraft Design for the Next Millennium

Alphagrif is an advanced flying wing design by Bill Hinote; it embodies the latest in materials and aerodynamic technologies to create an ultra-efficient airframe. Our goal is to create a safe and easy to build aircraft for the kit-aircraft industry.

My primary design goal is to create the lowest drag airframe possible; it was felt the low wetter area of an all-wing planform would promote this goal to the maximum extent possible, provided that laminar flow could be maintained throughout at the design (hoped for) speed of 200 mph.

An even more important parameter, however, is SAFETY; high-performance achieved at the expense of a docile, “user-friendly” airframe is a really bad idea. I have tried to keep this in mind as I designed my airplane, and I believe it will be easy to fly, with a mild stall and reasonably “conventional” stability and control characteristics.

A swept and twisted planform was selected because of its proven track record; the lift distribution approximates the “bell shape”, popularized by the German Horten brothers many years ago; the tips fly at a negative angle of attack at cruise speeds to provide the necessary download equivalent to a conventional tail. The extent and distribution of the twist are slightly less than optimum; it was deemed more important to maintain all stations of the wing in the laminar flow, low-drag “bucket” (see below).

Airfoil selection is the Eppler 502; this is a 15.7% thick airfoil, with no reflex, very mildly cambered. The use of a reflexed airfoil is deemed inappropriate by this designer (particularly at the tips) because of its reduced lift, and the fact the tips are way out of optimum AOA, with resultant drag rise. It makes more sense to select an airfoil optimized or each station on the wing; thus, each section can fly within the low-drag, laminar flow “bucket” of its design point. In Alphagrif, the total effective washout is 5.6 degrees, with 1.6 degrees attributed to the change in airfoils. To do this, the Eppler airfoil is modified in the outer panel starting at its root (station BL 45”), and ending with the airfoil INVERTED at the tip, in addition to the geometric washout. This means the airfoil is symmetrical at 70% chord, right at the desired zero-lift point along the wing at cruise AOA.

One thing I have noticed on many flying wings is excessive elevon deflection; this just HAS to be a BIG source of increased drag. I have created two fixes for this in my design: large-span, short-chord elevons create more effect with minimum deflection; also, I have incorporated cruise flaps in the center section. It is hoped that I can trim the airframe with the cruise flaps and eliminate the need for trim corrections with the elevons.

Other low-drag promoters are:

- Sailplane-like fuselage and canopy
- Large-radius wing root fairing
- Lower surface of wing extends unbroken under fuselage
- Pusher prop means undisturbed flow over airframe
- Prop inflow promotes continued airflow attachment over rear of fuselage
- Retractable nose-and maingear for lowest drag
- Sealed control surfaces, with near surface-mounted piano hinges
- Pilot air inlet at nose, with integrated pitot tube

Span: 24’ Area: 84 sq. ft. Aspect ratio: 6.9
Wing loading at 650 # max gross wt: 7.7#/sq. ft.
LE sweep: 20º (center section), 28º outer panel
Chords: 58” root, 42” span break, 32” tip
Stall speed: 50 mph Climb: 800 fpm or better
Range: 650 miles @ 60% (160 mph) with reserves
(note: performance figures are estimates only)
Fuel: 12 gals wing tanks & behind pilot’s seat
Flight controls: elevons operated by center stick, tip trailing-edge split drag rudders operated by rudder pedals, cruise flap operated by trim wheel.

Landing gear: tandem bicycle-style main gear, fully retractable and steerable; lateral stabilizing wheels faired into bottom of vertical fins
Engine: Pusher; probably Rotax 447
Materials: carbon fiber in room-temperature cure epoxies, over foam cores. Plywood used in certain high-stress areas.