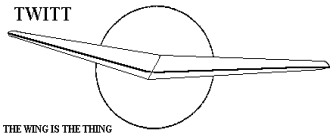
No. 324 JUNE 2013

T.W.I.T.T. NEWSLETTER

The Northrop Grumman Bat UAS is a rail-launched, net-recovered, runway-independent UAS shaped like a bat in flight. Source:
http://www.uasvision.com/2011/08/23/northrop-grumman-enters-bat-for-ied-hunting-sand-dragon-b-programme/

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., **1306** means this is your last issue unless renewed.



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.

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Wt/#Issues	FRG	AUSTRALIA	AFRICA
1oz/1	1.75	1.75	1.00
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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 (#1720), east side of Gillespie or Skid Row for those flying in).

TABLE OF CONTENTS

PRESIDENT'S CORNER

Timing for this issue was just right in that I got my main computer back from the shop a few days ago. It decided to crash right when I was going to start editing of Sailplane Builder so the May issue of that newsletter was late reaching everyone. But this one is going out on time with a full issue of material I think you will enjoy as you start working your way through the various links being offered up by everyone.

Although I made an editorial comment before one section from the Nurflugel group I wanted to make sure everyone knew that TWITT does not endorse any particular political leaning. The subject of who was responsible for removing items from the NASA web site are the opinions of the contributors and not TWITT. If you agree with some of the suggested methods for reversing what has happened, please participate in that program since it might have the desired affect on NASA.

If you have any opinions on some of the material included in this month's letter, please put them in writing and send them along to me so I can share. The Mini Bat has created a little bit of message traffic but there are some other really great letters that deserve some more attention from the Nurflugel guys and us. So fire up your keyboards and send that e-mail.

I hope your summer is getting off to a good start and you are back to flying.

LETTERS TO THE EDITOR

(ed. - Below is a letter I am assuming originated from the Nurflugel site since Ray Byrd doesn't appear to have been a member of TWITT. John Gibson submitted a reply and now some years later TWITT member Stephen Sawyer is asking some questions of Ray. Unfortunately Ray's e-mail address is no longer functional so if anyone out there happens to know Ray and could get these two together that would be great. I have passed this along to one of our NASA contacts to see if there is any way to make the link, but I haven't heard back yet. Your help would be appreciated.)

October 10, 2001

I have in mind to complete an embryonic preliminary design of a two-place, powered, tailless design using a BKB-type wing and controls mated to a fuselage designed after Fabio Goldschmied's Model, which if properly configured, is reported to have a drag coefficient of "zero", while also providing the propulsion.

I would like very much to know if anyone has experience or credible insight into either the BKB Wing or Goldschmied Body technology?

Thanks,

Ray Byrd
byrdr@xch-bsco-05.ksc.nasa.gov

August 16, 2002

Ray,

As an owner of an old rag-and-tube Kasperwing motorglider, I am interested in updating my flying to a more modern design while retaining the wonderful slow flying qualities of the Kasperwing. If you would be willing to include my e-mail address in any pertinent mailings that you make regarding your progress in design, construction and flying, I would be most appreciative. A super efficient design with thin film solar cells built into top surface of wings with electric propulsion would appeal to many recreational and soaring enthusiasts!

John Bottoms
bottoms@asapgroup.com

Greetings Ray,

After reading a TWITT newsletter, regarding your interest in a flying wing with a Goldschmied fuselage, I am wondering if you have planned one yet? I have just reviewed Fabio Goldschmied's design to attach boundary layer air and convert to trust.

It is " High tech," and not popular among home-builders yet. Is the suction nozzle functional with a propeller (outside) with an internal ducted fan pressurizing a center nozzle? Goldschmied's design will likely evolve into a new propulsion method.

Please see the EDAV at:

http://www.ultralightamerica.com/edav.htm

I hope to hear from you Ray,

Cheers ,

Stephen Sawyer
916 645-8494
Lincoln, California

Dear Andy,

I am sending you the entire file on Bruce Carmichael, Larry Haig, Jim Marske, etc., because things are not going too well at this end (97th birthday last week and I guess it is down hill from there on out). I'd like you to send me a copy in return and my plans are to simply re-sculpture the Mini Bat around anything other than the pressure recovery airfoil.

But if you ever hear what happened to Haig I'd be most interested. Please inform me.

If I get the results I expect, I'll inform you.

I still have not figured out the 1312 number in the box with my name and address.

Sincerely,

Syd Hall
Nevada City, CA

(ed. – I will definitely get copies of the material made and sent back to Syd so he can continue his work. Some of it is copies and may not reproduce well for inclusion in the newsletter, but I will see what I can do

with it as I also scan it for preservation in an electronic format.

Just to let Syd know his subscription is good until December 2013. The first numbers represents the last two digits of the year and the second two numbers are the month within the year. As many of you know I have been highlighting this number as you approach the month and then again for a couple of months after the expiration. At the third month past I move you to the non-member file and stop distribution until I receive a renewal. I really appreciate that most of you have continued to renew each year.)

Andy,

The May issue of the TWITT Newsletter posed some questions about Larry Haig's Minibat. Attached please find our "On the 'Wing..." article on the Minibat in which we propose a half scale model. Included in that article is information regarding Larry Haig and the flying qualities of the Minibat, along with Mat Redsell's harrowing experience with a too forward CG. There's also a post on the MatsFlyingWings email list which can be found at

<http://groups.yahoo.com/group/MatsFlyingWings/message/697>.

Hope that helps!

Bill & Bunny Kuhlman
bsquared@centurytel.net

(ed. – I have included some of the information from the file sent to us by Bill and Bunny. My thanks to them for sharing it.)

Andy,

The Daily Mail (UK) just ran an extensive story on Eric Brown. Capt. Brown was tasked with flying a number of captured German aircraft following WWII and translated the Nickel and Wohlfahrt book "Tailless Aircraft in Theory and Practice" for the AIAA Education Series. I don't think it's possible to reprint the DM web site article due to copyright restrictions (there's not even an option to print the article), but you might pass on the URL in the TWITT Newsletter:

<http://www.dailymail.co.uk/news/article-2320463/ROBERT-HARDMAN-Hero-Captain-Eric-Winkle-Brown-makes-Biggles-look-like-wimp-tells-story.html>

or the reduced in size URL from tinyurl.com might be better:

<http://tinyurl.com/burwlsa>

Enjoy!

Bill & Bunny Kuhlman

Pioneer and Monarch for sale. The modified Pioneer that we have used in the videos and flight testing is for sale. I can no longer fly and it is time to sell it. This glider has been a lot of fun and comes with a trailer and set up stands. Registered in the states. $10,000

I also have a Monarch F with trailer $8000
And I have an incomplete Monarch G for $7500.
about 75% done and have all the parts.

Mat Redsell
<mat@amtelecom.net>

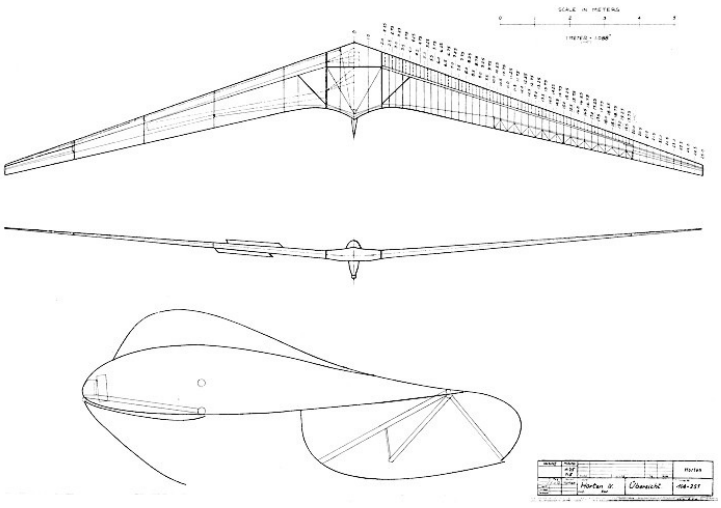
NURFLUGEL BULLETIN BOARD THREADS

(ed. – I didn't include this in last month's issue since I wasn't sure how it was all going to work out. So here are a couple of the messages that led up to the final solution on how to provide Horten drawings to a wider audience. I have also included a sample of a drawing in case you haven't visited the members only section and gone through them in the past.)

I don't know if anyone else saw these or not.

http://www.ebay.com/itm/ORIGINAL-Horten-Horton-IV-Flying-Wing-PLANS-ONLY-of-FULL-SCALE-GLIDER-/281100817173?pt=Motors_Aviation_Parts_Gear&hash=item4172ea1315&vxp=mtr

Bill Willard



Lacking creditable information. I could make scaled copies from books. Just my opinion.

Bill Sharpe

It is a print made from enlarged images in the Nurflugel website.

Bruno De Michelis

I don't know where these prints came from but he is only showing 12 of what should be at least 21 pages. Besides the PDF and TIFF files TWITT has of the 21 pages I think there are others out there with equivalent copies, if perhaps even more pages.

While I don't want to get into the distribution business I would be willing to copy both sets of images onto a CD for anyone if you send me the disc and a return envelope with the correct amount of postage to reach you with the disc. This would be the only cost to you. Just send the package to the address below. The mail is only picked up once a week so it may be a couple of weeks to get it back. It is my understanding that these are no longer copyrighted, but I have not been able to independently verify that information.

Andy Kecskes, President
The Wing Is The Thing (TWITT)

Hi Andy,

This would be fantastic! Very nice from you to offer this. I am certainly interested. I hope you allow for a suggestion to make any transfer of large files easier (specially for those of us that live outside the US) and more sustainable than sending things over the post.

Instead of sending CD's around you could use the free of charge services of WeTransfer (https://www.wetransfer.com/). It is very simple, first you collect all the emails from the interested people. Then you go to the website, add the files you want to send (you can bundle them in a .zip before for your convenience) and address the emails. It will take a while to upload but my experience shows that their server performance is reasonable. All the addressed emails will get a notification with a link to download the files. You only have to do this once and we all get the files. It is secure, the links have a limited life span of some days. If someone fails to download on time, he or she will need the transfer again.

With best regards,

Mario Campanella

After some additional thought I have solved the distribution problem by just creating a new link on our web site where you can view and download the various pages. The link is:

http://www.twitt.org/Horten_IV_Drawings.html.

My thanks to Bill and Bunny for offering to use their drop box, but this is easier for me right now.

I apologize to anyone who has sent me a disk already, but I will make the copies on it and send it back.

Andy

Very happy to see this goooood info online. Man, we are gathering treasures lately. :)

Keep that brain spawning wings,

Koen Van de Kerckhove

Thank you for making this effort. These plans are fantastic.

Mario Campanella

Great to have drawings for this classic airplane available on-line.

It reminds me that I have been sitting on the Horten XVc and motorglider plans for over a decade. I've sold photocopies to a few people, but I had to build my own mailing tubes to ship them - that's right, there are no mailing tubes to be purchased in Iligan City, Philippines. I kept the plans out of my catalog because of that hassle.

I think it may now be time to again investigate the possibility of having them scanned, or if that service isn't available, setting up a high-res digital camera on a copy stand and doing it that way. After all, I'm not getting any younger and neither are the drawings - I got them out of the way of the Typhoon "Sendong" floodwaters that invaded my house just in time and have them housed in a sealed PVC tube, but next time I might not be so lucky. Time to spread these around and make them digitally eternal.

Marc de Piolenc

(ed. – I have included the following thread since it is applicable to many of you that do on-line research. There are some obvious political overtones here and I have tried to minimize them without losing the essence of the discussion. I apologize if any of this offends a member.)

Folks,

As many of you might know, there has been an ever-expanding effort in the United States to restrict the export of technical information. This has recently reached an extreme. On March 20th, using a potential espionage case as a pretext, a member of Congress demanded that the NASA Technical Report Server (NTRS) be taken off line. NASA duly complied. A note appeared where NTRS used to be, saying that all documents were being reviewed for export compliance.

Today, I got an email saying that NTRS was back up. I went in and started searching for some documents I need to support some programs I'm working on. I was surprised to get no hits on quite a few, so I started searching for documents I know were there before the shutdown. To my surprise, many of the NACA Wartime Reports, published just after World War II, are gone. It now appears that this effort is extending to anything military-related. "NACA WR L-680 Flight Tests of NACA Jet-Propulsion Exhaust Stacks on the Supermarine Spitfire Airplane" - gone. "NACA WR L-149 Flight Tests of the Lateral Control Characteristics of an F6F-3 Airplane Equipped with Spring-Tab Ailerons" - gone. "NACA WR L-565 Measurements of the Flying Qualities of a Hawker Hurricane Airplane" - gone. Do a search on "P-51" in the title and you will discover that all the reports are gone.

If you are a US citizen and as opposed to this as I am, I encourage you to contact your elected representatives. I have never before contacted my Representatives and Senators, but they now all know my feelings on this subject. If we don't make ourselves heard, next thing you know, they will be pulling copies of these reports out of libraries, for export compliance.

I personally am downloading as many documents, as fast as possible, from the reopened website, before these are gone too. It gets even better: NACA Report-254 "Distribution of Pressure Over Model of the Upper Wing and Aileron of a Fokker D-VII Airplane", published in 1927, was there on NTRS on March 13th and now it's gone. I guess data on WWI aircraft are now export controlled. To get a copy, I had to import it from the Cranfield University website in the UK.

Funny enough, many reports on the F-16, F-18 and F-35 are still there.

David Lednicer

NACA reports are available from AERADE in the UK: http://aerade.cranfield.ac.uk/
Also a good source for British research, obviously.

I agree that we have to light a fire under Congress and the politically panicked, tim'rous fools at NASA.

Having confidently announced that AERADE could provide NACA reports pruned from the NASA TRS, I did a search for what Dave wanted and...came up empty.

Some research libraries have a collection of NACA reports on microfiche originally compiled by a company called UPDATA. I seem to remember, when I consulted that collection at CalTech, that it was pretty complete where the Wartime Reports are concerned.

I'm adding Dave's documents to my Wants list, with cross-references from the WR numbers which were applied after the documents were issued to the original report numbers. Hopefully, something will turn up.

Another thought has occurred to me, and that is to flood NASA with Freedom of Information Act requests. There's plenty of bibliographic material available showing what exists - more than enough to establish the existence of a "system of records" and of documents within that system. Each FOIA request must be answered with either the document(s) requested or a justification for withholding the document(s). A few enthusiasts (better yet, a few professional societies) could generate enough legitimate requests to backlog NASA's FOIA office. And there is a time limit for response, after which a Federal lawsuit is possible. Not something I would care to undertake alone, but there are plenty of people pissed off by this move...

Marc de Piolenc

It wasn't NASA's decision:

http://www.airliners.net/aviation-forums/tech_ops/read.main/333213/

It was congressman Frank Wolf who arbitrarily shut it down to score points as a national security watchdog at the expense of a relatively small group of people, ie us.

Nothing really new gets onto that server anyway and most of it is mirrored on servers that the US government doesn't have direct jurisdiction over so this interruption is just pickish symbolism. If you know the report number you can usually find an alternate source with Google. For instance: I just now downloaded one of the reported that has been deleted from the NTRS server, titled "Flight tests of NACA jet-propulsion exhaust stacks on the Supermarine Spitfire airplane", from the DTIC Online server:

<https://www.google.com/search?q=NACA+WR+L-680&ie=utf-8&oe=utf-8&aq=t&rls=org.mozilla:en-US:official&client=firefox-a&channel=rcs>

That's some real effective representation we've got there.

Libratiger

It WAS NASA's decision.

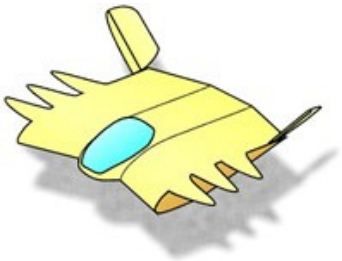
One Congressman does not have the power to dictate policy to an Executive Branch agency. To do that, Wolf would have had to get a bill through both houses of Congress and signed by the President dictating the new policy. Nothing of the sort happened. What did happen was that bureaucrats running a highly politicized agency panicked at a comment by one noisy "representative." What I'm saying is, they need to be taught not to pull out a hankie every time some congresscritter sneezes. There needs, in other words, to be countervailing pressure from other sources, using other means. Hence FOIA.

I've opened a database table of "disappeared" technical reports (NASA isn't the only agency pulling this nonsense - don't get me started on the DoE!). It will list bibliographic references, alternate sources if known, and will be made available to anyone who needs a list of these reports for use in a FOIA request or before a Congressional committee. I've dug out all my NACA bibliographies and indexes from backup disks to speed the process.

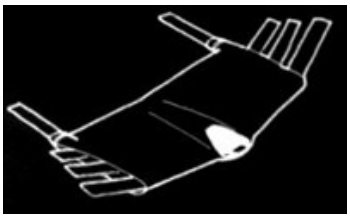
Marc

I just finished the revival of my old Bird Wing proposal. It is a flying plank with some features I thought up several years ago. Thanks to a old contact I remembered the existence of that page, so now that I had some time, I did the reprogramming of that page to my new system. More of the old ideas will follow online. Dragon Tail idea is online too.

http://www.nestofdragons.net/weird-airplanes/few-of-my-thoughts/



Bird Wing



DragonTail

Several years ago some person wrote me a letter about the will to have a weight shifter but ...with the performance of a stick controlled hang glider like the Swift. He simply wanted to win competitions. I gave him this idea. The Mixed Hang Glider Control. This page was a part of my old website. It was not online for years. Now it is again.

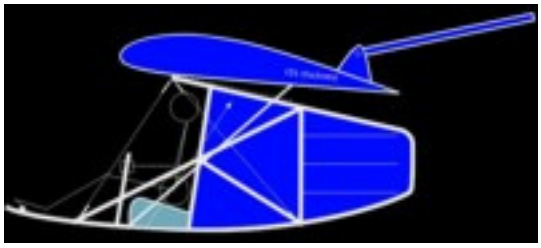
http://www.nestofdragons.net/weird-airplanes/few-of-my-thoughts/mixed-hangglider-control/

Mixed Hang Glider

Sad to see that a design that might win competitions never went into production. I am not competition-minded but even I see the abilities of this concept.

I just drew this hang glider. It was a attempt to create a small sized hang glider where not much assembly was needed before flight. I combined two older ideas. My Bird Wing and my Bird Tail. Just go see and tell me your opinion.

http://www.nestofdragons.net/weird-airplanes/few-of-my-thoughts/the-bird-glider/



Bird Tail

Keep that brain spawning wings,

Koen

Koen,

About a decade ago, Brightstar and Wills Wing worked together to build a control bar version of the Millennium hang glider. I saw it fly a few times, and it looked very promising. There are still a few photos on the Wills web site. I was always a little disappointed it did not go into production...

Al Bowers

Koen,

I like your idea for weight-shifting cage, though it does have the disadvantage of not being able to use your body's inertia around the yaw axis to initiate turns with the glider.

This may be a minor issue, as novice & intermediate performance flexwings can be flown OK without it, but high-performance flexwings, like Wills T2, Moyes Lightspeed, etc. are often flown by expert pilots using this yaw-with-the-body turn initiation technique. Most pilots don't even think about it, they just instinctively "lead with the feet", which does yaw & roll simultaneously.

I've been working on something similar.. controlling a flewing with a joystick.. essentially using a joystick to warp the outer panels of the sail to function as elevons.. pitch is elevon and weight shift combination, but it's all in the joystick.. no body movements except a flick of the wrist. It works well on RC models with servos, and currently I'm modifying two full scale hang gliders.. should have some flight tests under my belt by the end of the year.

I will not be attempting to comply with any HG competition class rules, as I find this to be an unnecessary and detrimental constraint to put on the design. I was surprised by how much fun it is to fly a hang glider with a joystick. The stability, control authority and reclined position of the SWIFT inspires confidence and allows you to really relax while piloting it. I am much more on edge and physically uncomfortable when flying a weight-shift flexwing compared to the SWIFT.. but a flexwing is SOOO much easier to transport and ground handle than the SWIFT.

A joystick-controlled flexwing has the potential of combining many of the advantages of the two.

Happy landings,

Dan Moser

Hello every one,

Last week three Horten Nurflügel interested people from Germany founded the IG-Horten (IG means Community of Interest).

We are still at the beginning of creating a website but we launched our panel where every one from you is invited to join (we have an German and an English part) and discuss at first about Horten and other topics like "Blended Wing Body" and so on.

Our concern is to bring back the Horten brothers and their aircraft a little more back in the visual field in Germany because in July 75 years ago they made the first flight with the Horten I.

http://www.IG-Horten.de/

Regards

Jörg Schaden

Anyone come across this before?

http://uk.youtube.com/watch?v=FTn-3AD7J5M

(ed. – This is a short video of flying wings being sloped soared. There are links to some other videos available when going to these links.)

They are drawn and made by a fellow from my country and i have seen some photos and movies of them.

One of them, the one without winglets, has some gull like dihedral on the root but he other has an normal dihedral. I can ask him about plans.

Have good flights

Chispas
Portugal

Klingberg wing footage.

http://www.youtube.com/watch?v=uzlJkFZKCzc&feature=channel_video_title

Here is another link from the same area.

http://www.youtube.com/watch?NR=1&v=cMXNLqFqkVM&feature=endscreen

more info here too...

http://www.delta-club-82.com/bible/660-hang-glider-klingberg.htm

Paul Westrup

Nice find, Paul.

I heard it really didn't fly much after that. The oral tradition holds that all the problems in the RC 2m Klingbergs manifested themselves in the full-scale version, and it wasn't very pleasant to fly (lots of dutch-roll)...

Al Bowers

I am remembering that there was a rather horrific accident with the Klingberg 'wing which resulted in severe injuries to the pilot. I'm also remembering a still photo taken from the left rear while the wing was in flight, which showed large distortions of the covering on the upper wing surface near the wing tips. Major air flow separation at that point on the wing would have made controlled flight difficult or impossible, particularly if the distortion was intermittent.

Am I remembering correctly?

Bill & Bunny Kuhlman

B^2,

You have more info than I do. I never saw the picture. If you find it, a scan would be priceless...

I find it interesting that so many of these great ideas got derailed at some point or another. The Moyes version of the H Xc. The Rochelt wing. The Klingberg.

I note that the ones that got sorted well also did very well, notably the Swift and the Millennium.

We can all play “what if” but history is what it is...

Al Bowers

I hope this URL doesn't get truncated:

<http://www.homebuiltairplanes.com/forums/aircraft-design-aerodynamics-new-technology/6524-stability-swept-wing-no-washout-elevons-alone-21.html#post98766>

Norm Masters

Re: Stability in a swept wing with no washout from the elevons alone. Posted by Rol, April 2011

I'll be posting more video of it soon. Boy, the folks talking about the stability of flying wings must not be engineers and they really don't know much about my Wing. I don't suffer fools gladly which is why I moved out of the public eye, but I'm bored tonight, so I'll have some "fun". Here are the facts - the Klingberg Wing employed a bell-shaped lift distribution based on the work of the Horten brothers. The bell shaped lift distribution provides reasonable static stability for pitch, roll, and yaw. What a lot of people don't understand and hence “forget” to talk about is dynamic stability. This is a very complex subject compared to static stability as it is controlled by damping rates which required some high powered calculus to calculate. Dynamic stability of flying wings is very challenging and requires the balancing of many design factors. The Klingberg Wing gained most of its dynamic stability via airfoil selection, wing twist, and by keeping the vast majority of the gross weight as close to the centerline as possible. Now, remember that any flying wing that uses a bell-shaped lift distribution will have significantly lower performance than a conventional configuration (with tail) due to the fact that the effective span is much less (lift distribution is non-optimal). This is because the last 20 to 30 percent of each wing is performing the function of a horizontal tail. The often stated fact that a flying wing will have superior performance due to lower drag is generally false. Only if it is very carefully designed to have minimum drag, will it have the same or superior performance to a "normal" configuration. There are some exceptions to this fact that are only recently afforded by computer control systems because the designer can go with a statically unstable configuration and let the computers keep everything lined up in flight. Going down this path allows a lift distribution much closer to the optimal elliptical form. I designed the Klingberg Wing as a pure wing mostly for factors other than performance. It made transportation much easier, the weight lower, and most importantly, much easier to launch. Try running down a hill with a 100 lb hang glider (my Wing was 85 lbs) with a tail dragging on the ground and you’ll understand my point. Now, to the meat of the matter about adverse yaw during a turn on a pure (no winglets or other vertical surfaces) flying wing. Now, read closely. What everyone seems to not understand is that adverse yaw means NOTHING to a pure wing. This is true for yaw angles up to 20 degrees or so (quite extreme). For a pure wing, there is no performance change no matter where the "nose" is pointed. What matters is flight path. The problem is one of pilot perception. When I taught people how to fly my models, once they learned to ignore where the nose was pointed, there were no more problems. The same was true for the full size wing. It is just a “problem” of pilots being conditioned to expect to have the nose pointed in the flight path direction. This is very important for conventional configurations (due to drag), but is virtually meaningless for pure wings. So, this whole argument about adverse yaw with pure wings is entirely pointless. It simply doesn’t matter to the aircraft. For some flying wings, adding winglets can allow a slight increase in performance and for those designs, adverse yaw IS an issue because of the related drag. Moving on; due to so many “armchair engineers” worried about this yaw “problem” I added the Autoyaw system I invented to the various models of the Klingberg Wing (afterall, I wanted to sell more of them). For those who used the Autoyaw system, the “problem” was solved. Plus, it was much easier to tow the glider and it made the launch of the Klingberg Rocket Wing much more pleasing. Bottom line, if you have a pure flying wing, stop worrying about the adverse yaw “problem” and leave the design work to the engineers. Just go flying, pay attention to the flight path, ignore where the nose is pointed, and have a fun flight!

Norm,

The link came through fine. As did Mr Klingberg’s message.

Well, I disagree with Mr. Klingberg. If he truly did have a true bell-shaped lift distribution (I would love to see the data and analysis by which he developed his wing), then it would not have any issues with adverse yaw. And any examination of the footage of Horten flying wings would show they were ROCK SOLID in yaw (no beta). The German wings were very good in

non-maneuvering flight, and the Argentine Horten wings were solid ALL the time (after Reimar sorted out the control input problem). Go look at the video of Diego Roldan's Ho-Ib flight, not a trace of adverse yaw.

Mr. Klingberg is correct that you can get a bell shaped lift distribution with careful planform, twist, washout, and airfoil selection. But I don't believe that the Klingberg wings got there. And two key give-aways that something was missing are 1/ spin behavior (the Klingberg wings require pilot technique to recover, no Horten wing required specialized technique to recover, just relax the back pressure on the stick and the wing recovered immediately) and the tip chord (Klingbergs had relatively large tip chords, Hortens had very small "pointed" tips).

I don't see how anyone could reverse engineer Horten's wings without going back to Prandtl's 1932 paper, or the papers by Jones (1950) and Klein/ Viswanathan (1975, well okay, maybe you don't need this one). Looking at Udens' data, it was clear that he understood the problem completely. It is clear to me that Reinhold Stadler also completely understands the problem. As do the PUL-9, PUL-10, and H-3000 designers.

I have shared my analysis and data, and I am willing to do so again. And as I have stated, I could not believe the data when I first calculated it. It took the unwavering belief of Mike Allen by building and flying a wing to convince me. And Mike's wing has no stall problems, no spin recovery issues at all, and has no adverse yaw (it too is rock solid).

It appears to me that something does happen in the dynamics as well. The true Horten wings seem to have a completely over-damped solid response to control input. There is no oscillation, not in any axis. I can't explain that (if I had the time I do have the tools to try and unravel the mystery)...

Al

Apologies to all. My gray matter isn't what it used to be. Years ago we had a discussion of a German gentleman who was "experten" with the Eppler PROFILE code. He had a website and did a lot of work with RC sailplanes, designing custom airfoils for RC. I have done a few searches and can't find or recall his name. Does this ring any bells with our long-time contributors?

I've got the links for Drela's for the Apogee and Super Gee airfoils...

Thanks for any and all pointers...

Al Bowers

Al,

Are you referring to Dr. Martin Hepperle? If so;

http://www.mh-aerotools.de/airfoils/index.htm

Regards,

Jack Ralston

Well then, try here. Most of the popular designs are shown and might jog a cell or two.

http://www.aerodesign.de/english/index.htm

Dan

REINHARD SIELEMANN!!!!

Apologies for the following rant: For those of you who don't know Sielemann, he's a GENIUS. Certainly on the scale of Drela or Selig, but he gets very little recognition. Especially here in the English speaking part of the world. But he has a skill with Profile, particularly at low Reynolds numbers, that is exquisite.

When I was doing my grad research with Profile, we did find it worked very well in attached flow all the way down to under Reynolds numbers of 5000 (I got decent results at Re=2000). I could never get Xfoil to work well for me (I will freely admit my experience with Xfoil is very limited!), its okay Mark still thinks of me as a friend of his. ;-) And I eventually got to design airfoils that would work at Re=20,000 or so. I wasn't a ¡°wizard¡± at Reynolds numbers below that (I can do it, but I get REALLY conservative), but Sielemann is excellent at design down there. I can do analysis all the way down, but I am a neophyte at design with Profile, especially at low Reynolds numbers down there...

Al

AVAILABLE PLANS & REFERENCE MATERIAL

Tailless Aircraft Bibliography

My book containing several thousand annotated entries and appendices listing well over three hundred tailless designers/creators and their aircraft is no longer in print. I expect *eventually* to make available on disc a fairly comprehensive annotated and perhaps illustrated listing of pre-21st century tailless and related-interest aircraft documents in PDF format. Meanwhile, I will continue to provide information from my files to serious researchers. I'm sorry for the continuing delay, but life happens.

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Books by Bruce Carmichael:
Personal Aircraft Drag Reduction: $30 pp + $17 postage outside USA: Low drag R&D history, laminar aircraft design, 300 mph on 100 hp.
Ultralight & Light Self Launching Sailplanes: $20 pp: 23 ultralights, 16 lights, 18 sustainer engines, 56 self launch engines, history, safety, prop drag reduction, performance.
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Collected Aircraft Performance Improvements: $30 pp: 14 articles, 7 lectures, Oshkosh Appraisal, AR-5 and VMAX Probe Drag Analysis, fuselage drag & propeller location studies.

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VIDEOS AND AUDIO TAPES

(ed. – These videos are also now available on DVD, at the buyer's choice.)

VHS tape of Al Bowers' September 19, 1998 presentation on "The Horten H X Series: Ultra Light Flying Wing Sailplanes." The package includes Al's 20 pages of slides so you won't have to squint at the TV screen trying to read what he is explaining. This was an excellent presentation covering Horten history and an analysis of bell and elliptical lift distributions.

Cost: $10.00 postage paid
Add: $ 2.00 for foreign postage

VHS tape of July 15, 2000 presentation by Stefanie Brochocki on the design history of the BKB-1 (Brochocki,Kasper,Bodek) as related by her father Stefan. The second part of this program was conducted by Henry Jex on the design and flights of the radio controlled Quetzalcoatlus northropi (pterodactyl) used in the Smithsonian IMAX film. This was an Aerovironment project led by Dr. Paul MacCready.

Cost: $8.00 postage paid
Add: $2.00 for foreign postage

An Overview of Composite Design Properties, by Alex Kozloff, as presented at the TWITT Meeting 3/19/94. Includes pamphlet of charts and graphs on composite characteristics, and audio cassette tape of Alex's presentation explaining the material.

Cost: $5.00 postage paid
Add: $1.50 for foreign postage

VHS of Paul MacCready's presentation on March 21,1998, covering his experiences with flying wings and how flying wings occur in nature. Tape includes Aerovironment's "Doing More With Much Less", and the presentations by Rudy Opitz, Dez George-Falvy and Jim Marske at the 1997 Flying Wing Symposiums at Harris Hill, plus some other miscellaneous "stuff".

Cost: $8.00 postage paid in US
Add: $2.00 for foreign postage

VHS of Robert Hoey's presentation on November 20, 1999, covering his group's experimentation with radio controlled bird models being used to explore the control and performance parameters of birds. Tape comes with a complete set of the overhead slides used in the presentation.

Cost : $10.00 postage paid in US
$15.00 foreign orders

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