

T.W.I.T.T. NEWSLETTER

Nurflügel-Meeting 14. + 15. August 2004 in Axalp(CH). Apparently the weather did not fully cooperate and long flying times were not the norm. This seemed to be identified as the only all nurflügel meet in this area of Europe for 2004. The next meeting in 2005 will be on the Wiriehorn(Schweiz). Source: http://www.flying-wing.de/fw_axalp04.html

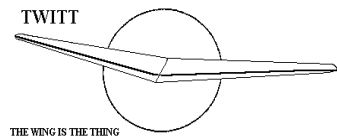
T.W.I.T.T.

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., **0501** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, January 15, 2005, 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.

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Subscription Rates: \$20 per year (US)
 \$30 per year (Foreign)

Information Packages: **\$3.00 (\$4 foreign)**
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\$1.00 ea + bulk postage

Foreign mailings: \$0.75 each plus postage

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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).

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PRESIDENT'S CORNER

I hope everyone had a very joyous holiday season and that your New Year's celebration was fun but safe. We are looking forward to 2005, especially since we have two good programs lined up to get things started. So for those of you in Southern California make sure to mark your new calendar for the third Saturday in January and March.

There are some interesting messages in this month's issue for you to ponder. I would really like to hear from any of you who have an opinion or can offer some additional information, like more websites, to the mix of information.

Speaking of websites, I am going to try and get some work done on ours in the next couple of weeks. I have to add a few past newsletters to the members only section and several requests for assistance, such as Hugh's you will see later in this issue. All the website links that have come through will also be added to the applicable pages. I found it interesting that there are more sites out there that have information on flying wings than in the past. Some of them are just rehashes of other sites, but there is also some new material out there for both the modeler and full size enthusiast.

Now that winter is upon us, I imagine some of you will be spending more time in the workshop working on your pet projects. Please keep us in mind if you have a couple of minutes and write us a note and send us a picture.

HAPPY NEW YEAR



JANUARY 15, 2005 PROGRAM

We are very pleased to have **Dave Raspet** giving us a presentation on his father's traits that made him unique within in the aviation community. This will give you an inside look at Dr. August Raspet of Mississippi State University (MSU), which was one of the premier flight test facilities in the country, and included extensive testing of a Horten IV with pilots like Ray Parker and Rudy Optiz. Dave has given a similar presentation at the SHA Western and Central Workshops over the years and it has been very well received. So if you haven't had a chance to hear him talk about this part of flying wing history, make sure to make this month's meeting.



During the period of 1953-62 Dave was a member of the MSU Glider Club. He did various sailplane performance and research test-flying projects as pilot and test engineer. One of the projects was an attempt to mechanize dynamic soaring (what we now call dolphin flying) using an autopilot and an LK that had a moveable weight that would get the c.g. far enough aft to make the LK unstable in pitch.

From 1962-67, while in the Air Force at Wright-Patterson AFB he did exploratory development of energy conversion concepts at the Aero-Propulsion Laboratory. He moved on to the Los Angeles Air Force Station from 1967-1989 spending his entire time in the National Reconnaissance Office managing national security satellite design, production and on-

orbit operations as well as satellite integration onto four different launch vehicles including the NASA Shuttle.

After retiring from the Air Force, Dave spent 1989-2001 at McDonnell-Douglas/Boeing doing various jobs in the management of launch and satellite systems. He ran a classified satellite program, was the first Director of the Delta IV program, Director of the Low Altitude Demonstration System program and, Space Segment Lead for the Future Imaging Architecture program.

Since 2001 he spends about 1/2 his time in the field of space system management mostly directly with the Air Force offices managing launch vehicles and launch vehicle integration.

In 2003 he was a member of the Landmark nominating and planning committee for the establishment of the Raspet Flight Research Laboratory as the 13th Landmark of Soaring. Chairman of the committee was Dr. George Bennett and other members were Dick Johnson, Bruce Carmichael, and Dr Dave Lawrence. He is a member of the MSU External Research Advisory Committee and, his most recent published work was "Raspet Flight Research Laboratory: The Newest Soaring Landmark" published in the October 2003 Soaring.



LETTERS TO THE EDITOR

December 6, 2004

Nurflugel Art

I was looking around to see what's new nurflugel-wise on the web and ran across this collection of magazine illustrations. The first one is cropped from the Feb 1947 issue of "Fortune" and has replaced the composite of TWO of Wolfgang Uhl's U2s flying under the Golden Gate Bridge as my desktop background.

<http://cccw.adh.bton.ac.uk/schoolofdesign/MA.COURSE/13/LFW.html>

Norman Masters
<nmasters@acsol.net>

(ed. – Thanks for pointing us in the direction of this site. I have included one of the illustrations from it so everyone can get an idea of what you are talking about.)

December 8, 2004



December 8, 2004

Andy:

I just realized (late as usual) that I had not renewed the subscriptions! Please renew all four (Fred, Stefan, George, and myself. I'll get a money order in the mail.

How is the gang? Please extend my greetings. It's nice to see the pictures of familiar faces when I get my newsletter, which I might add, is still excellent quality. Hats off to you for always pulling it all together in fine fashion.

My best to all of you at TWITT: Bob, June, Pat, Bruce, Gavin, Jim, Morgan, Norm, and so many others.....

Stefanie Brochocki
<sbrochocki@yahoo.com>

(ed. – We haven't heard from Steff for quite some time so it is nice to hear from her. We miss George and her coming to California during the summer to give us an update on anything related to the BKB-1. Excessive work loads and other commitments have prevented it in the past couple of years, but perhaps she will be able to rearrange her life and visit us again. I think there are some new developments on the horizon and hopefully she will be able to share them with us in the future.)

Eagle Mounted TV Cam

Hi everybody

For those curious about the Animal Planet story and video of the eagle with a miniature TV camera mounted, the shots are very interesting

<http://media.animal.discovery.com/convergence/spyontnewild/birdtech/birdtech.html>

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(ed. – Copy and paste the URL into IE and click your way through the various parts. The short video clips are fascinating. Ain't technology great.

If you are one of our members without an Internet connection, this is the sort of thing you are missing. You may see some of the shots by watching Animal Planet or Discovery, but if you didn't record it, that is the last time you see until the reruns start. Going on line also gives you the opportunity to view much more than what is shown on the TV.)

December 10, 2004

Bird Wingtip Research

Hi Bob:

My name is Greg Fillman. I am an engineer at Nova Composites. We build composite parts for aircraft in the Seattle area. We are very interested in winglets these days. I think the wing tips of your pelican and buzzard are some of the most sophisticated (manmade) winglets I have ever seen. I am very impressed; I wished I could have heard your presentation to TWITT in 2002.

The very negative angles of attack you found as optimum for your wing tip feathers is fascinating and confirms all this verbiage about upwash and leading edge thrust at the wing tip.

I was wondering how the bird models flew before you had found the optimum flying angles for the tip

feathers? When the tip feathers are flying at more positive angles of attack, is the drag of the model higher than having no tip feathers at all? How did your models fly when these angles of attack were wrong?

Sincerely,

Greg Fillman
<fillman@novacomposites.com>

(ed. – I haven't seen a reply from Bob on Greg's comments, but I have written to Greg telling him that Bob's 1999 presentation is available on VHS – we didn't tape his 2002 presentation giving us an update on the models.)

December 12, 2004

SGIAN DUBH – French Connection

Andy:

Do you know of any flying wing enthusiast in France who would be interested in advancing the development of my SGIAN DUBH project? I have recently removed the Rotax 447 engine for another project. I am seeking a competent person who would be interested in taking it through the taxiing stage to flight-testing.

Requirements:

- a) Good knowledge of aerodynamics.
- b) Be mathematically competent.
- c) Live close to Tours or any other accessible airport (by cheap airline e.g. Ryanair).
- d) Interest in flying wings and have a basic understanding of same.
- e) Have a spare Rotax 447 (or similar)

I would even transport aircraft to France. Right now it languishes in two garages and I need the room. I have taxied it a couple of times with the wings off on a rough grass field and have subsequently made up my own glass U/C and modified the nosewheel and steering.

No money is wanted, just interest and enthusiasm. I don't want to give it to just anyone, so if anyone is interested, they will have to convince me of their abilities.

I know the U.S. of A. is the place to be, but there is a wee problem..... the Atlantic.

Hugh Lorimer,

Alpbach,
Stair, Ayrshire, Scotland, KA5 5JB
<lorimer@alpbach2.fsnet.co.uk>

(ed. – This sounds like a fantastic deal for someone in France that has the background Hugh is looking for to take over this project. I have included a picture to remind you of what the SGIAN DUBH looks like and you can see it pretty much completed so wouldn't require as much work as starting on a new project. You can find out more on this design by visiting: <http://www.twitt.org/HLorimer.html#top>)



December 13, 2004

Klingberg Kits For Sale On eBay

Hello,

I am in the middle of putting 5 Klingberg Wing kits on eBay. Look for my eBay name (robert_not_bob). If that doesn't work, let me know, and I will help out further.

Thanks,

Robert Allen Schwartz
<notbob@tessellation.com>

(ed. – This was received before the holidays as an inducement to buy kits for gifts. I haven't check eBay so don't know if they are still actively on sale.)

December 13, 2004

December 16, 2004

Two Boeing X-45A Unmanned Jets Continue Coordinated Flights

http://www.boeing.com/news/releases/2004/q4/nr_041210n.html

<http://www.boeing.com/defense-space/military/x-45/flash.html>

Bob Storck
<bstorck@sprynet.com>

(ed. – Take a look at these sites and get up to date on this commercial flying wing program. I have included one of the media pictures from the first URL.)



December 14, 2004

Hi Andy:

I think having the news letter on the web site would be fine. The San Francisco Vultures, model aircraft club, has done its newsletter by e-mail for years and it has worked well.

Merry Christmas and best regards for the New Year.

Allan Morse
<skunkdaddy@juno.com>

(ed. – After the first of the year I will be looking into coming up with a pricing plan for electronic delivery of the newsletter for those members who would like to have it. Of course, if you want to pay the full price you would still be able to get the electronic version for quicker delivery and then receive the hardcopy a week or so later. More shortly.)

Concorde

Hi:

This is all about Concorde, a sort of commercial nurflugel. I went to a talk by a retired British Airways Concorde senior pilot. Amongst the many things he had to say was someone or other wanted to have photographs of Concorde when it was supersonic so they got a Tornado to do the photographs at a bit above Mach One. After the photos the Concorde pilot opened the taps and accelerated away; the Tornado could not keep up and was left behind. He also agreed that the Lightning was the only aircraft to overhaul a Concorde on air test, see letter below at end of text.

Regarding the French accident. Everyone knows that the crash was caused by a piece of alloy left on the runway by a previous jet, but what you may not know is the following. Four days prior to the accident Air France completely stripped the left main landing gear and obviously reassembled it. However there was a spacer left out from one of the wheel assemblies. This allowed one of the wheels to shimmy 7 degrees to either side. It was also shown that one of the tires on the left hand side main gear either lost air pressure during the taxi to take off or lost it quickly on take off.

One of the French pilots said that the takeoff was 20% slower than normal. It was shown that Concorde had tracked a curve to the left on its take off run. You may not know that it was determined that the fuel tanks on that fateful Concorde were 100% full. This senior pilot from British Airways related that the book said that the tanks should have a max of 82% fuel in them.

It was determined, post crash, that a 4.5 kg chunk of rubber that came off one of the tires hit the under side of the wing in the area of tank 5, however the tank skin displayed signs of something bursting out from the inside. The rubber chunk smacked into the tank skin, this set up shockwaves, which bounced round the tank bay, and then found the easiest way out was through the piece of tank bay skinning that had been strained by the rubber chunk hitting it.

It was also shown that this fateful Air France Concorde was 1.5 tons over the recommended max all up weight. It was also shown that the Concorde was told by French air traffic control to take off with an 8 knot downwind component. There was a 747 parked, waiting for Concorde to clear the runway so it could line up and begin its take off. So Concorde is veering left, left wing down, fuel streaming from the left wing, and on fire, it misses the parked 747 by 20 feet, not 20 metres, (this is from the co-pilot of the 747). On this

747 is President Chirac and his wife, so the situation goes from losing an iconic aircraft and 100 passengers to losing another 300 plus passengers, and the French President.

The French position regarding the American lead war in Iraq meant that Air France Concorde flights were boycotted. Air France Concorde flights only had single figures of passengers on them. Air France was losing money in massive quantities. British Airways have drained all the vital fluids and given all their Concorde to museums. Not so Air France. In fact an Air France Concorde has engine runs every week. Whether this is the same aircraft or a few that are rotated is unknown. The Concorde pilot then said that Air France will be flying a Concorde in a year or two.

LIGHTNING vs CONCORDE

The Lightning that once overtook Concorde was described as "the best of the best" by Flt Lt Mike Hale at the roll-out ceremony for XR749 at Teeside Airport on September 28th 1995.

Now an instructor with 56 Sqn at Coningsby, Mike flew 80 sorties in XR749 after the aircraft was allocated to 11 Squadron at Binbrook. He has a particular affection for the aircraft: "The Lightning was an exceptional aircraft in every respect, but XR749 was one of the best of the best. It is probably the best aircraft that I will ever have had the privilege to fly. Because of her tail code BM, she was known as "Big Mother", although the tail code changed to BO for her last few months on 11 before joining the LTF in January 1985.

She was a very hot ship, even for a Lightning. She remained my aircraft for all her time on 11 Sqn despite my being entitled to an F6 as I moved up the squadron pecking order. I invariably asked for her to be allocated to me for the major exercises such as MALLETT BLOW, OSEX, and ELDER FOREST despite her being a short range F3 - there were invariably plenty of tankers about!" His memories include the time in April 1984, during a squadron exchange at Binbrook when he and XR749 participated in unofficial time-to-height and acceleration trials against F104 Starfighters from Aalborg. The Lightnings won all races easily, with the exception of the low level supersonic acceleration, which was a dead heat. This is not surprising when the records show that the year before on one sortie XR749 accelerated to Mach 2.3 (1500 mph) in September 1983.

In 1984 during a major NATO exercise he intercepted an American U-2 at 66,000 ft, a height which they had previously considered safe from interception. Shortly before this intercept, he flew a zoom climb to 88,000 ft and, later that year he was

able to sustain FL550 while flying subsonic. Life was not entirely without problems, however, as in a three-month period his No 2 engine seized in flight and its replacement failed during a take-off when intake paneling on the inside of the aircraft became detached and was sucked into the engine. In April 1985, British Airways were trailing a Concorde up and down the North Sea. When they offered it as a target to NATO fighters, Mike spent the night in the hangar polishing XR749 which he borrowed from the LTF for the occasion and the next day overhauled Concorde at 57,000 ft and traveling at Mach 2.2 by flying a stern conversion intercept. "Everyone had a bash - F15s, F-16s, F-14s, Mirage, F-104s". "But only the Lightning managed to overhaul Concorde from behind" !

Mark Hills

<markhills@clara.co.uk>

(ed. – This was an item from the Nurflugel bulletin board, but I thought it has some interesting insight into the Concorde incident and, I just left the part about the Lightning for the fun of it. Sorry about the sentence structure some times, but I didn't want to spend anymore time trying to clean it up.

You can find more of the "official" accident information at the website listed below. I have also included a picture from one of the sites just to remind everyone it is a delta wing tailless aircraft.

<http://aviation-safety.net/specials/af4590/>)



December 23, 2004

Incident Angle of Primary Feathers

Bob:

I have seen your "birds" on the TWITT web site <http://www.twitt.org/1partdrib.html> and was confused by the negative incidence you use on the model's primary "feathers." A negative 27-degree angle for the first feather seems something like the

twist used on swept flying wings but of course much more extreme.

My confusion comes from what can be seen on actual soaring birds like the Condor at the web site <http://www.winggrid.ch/Whatisit.html> (bottom of that page - see image below) and all other similar pictures of soaring birds with low aspect ratio wings. Their primary feathers are all showing positive angles of attack with descending stagger and no overlap. Your models seem to have descending stagger and no overlap but of course with a severe negative incidence angle.



The "wing grid" folks at <http://www.winggrid.ch/index.htm> say that their models mimic real birds and produce rectangular span load instead of elliptic span load due to reduced induced drag. (See example of one of their test aircraft below.) All their "finger feathers" are at positive incidence (although varying) and ideally inclined to the air streams to produce equal lift per blade (See <http://www.winggrid.ch/winggrid%20basics%20031202.pdf>).



I am planning on designing an ultralight aircraft in the shape of a Bald Eagle, to include the finger feathers of the real bird. I assumed the rationale used by the "Wing Grid" folks was the way to go, especially as that is how the actual bird does it. Your models using negative incidence on the finger feathers seems

in opposition to what the birds and the "Wing Grid" folks are doing.

I would really appreciate some of your reasoning to set the incidence of your models primary feathers at a severe negative angle and would this reasoning apply to an ultralight airframe?

Thanks,

Joe Sales
<bigbird@vfronly.com>

(ed. – By the time this went to print I hadn't seen a reply from Bob answering Joe's questions. It seems that bird flight and wing tip feather arrangements are becoming a more popular topic lately.)

December 27, 2004

Ellipstic And Other Matters

Elipstik is a design by Tom Hunt, and a lot of info can be found on various designs of his, at his site Modelair-Tech (www.modelairtech.com), and Titanic Airlines is his European Business Partner!



Tom Hunt is holder of some world records in model flying and is often called for to make small scale R/C aircraft for the aeronautical industry, as proof of concept.

He used to be an employee at Grumman, but that might have changed!

A Happy New Year,

Tord S Eriksson,
<tord@tord.nu>
Sweden

PS: Terry Baxter will be very disappointed when he tries his Catch-22 design, if anything comes off it, as his landing gear does not take into account that such a

low aspect ratio wing need a lot of rotation to give take-off lift, unless he has a lot of power - which he has not planned to use - and extremely long runways!

Here's my VISA! I'll be back in two years time, or earlier, if you want me to come earlier, and collect my baby! OK?"

And then I'd walk away, as to leave them to it – unless they wanted to show me something :-)!

Sadly, most of us can't even afford to go visiting them!

BWB And Other Matters

Being an aviation buff since my early teens I must confess to having built a few flying wings through the years, and I once studied to become a aeronautical engineer. Alas, that was not to become my profession.

It amazes me to see that so many TWITT flying wing enthusiast's design straight-winged aircraft, which we all now are difficult to handle, not least in pitch! And a lot of them look to have pretty interesting rearward CG's!

Seen a little film of a subscale BWB flying, and that seemed to be a bit twitchy, too!

The BWB seems a perfect example of a design that should be tested using an existing airframe and then just add "padding" till you'd get the right form. Say an old MD-11 and discard the lower engines and just use the top one!

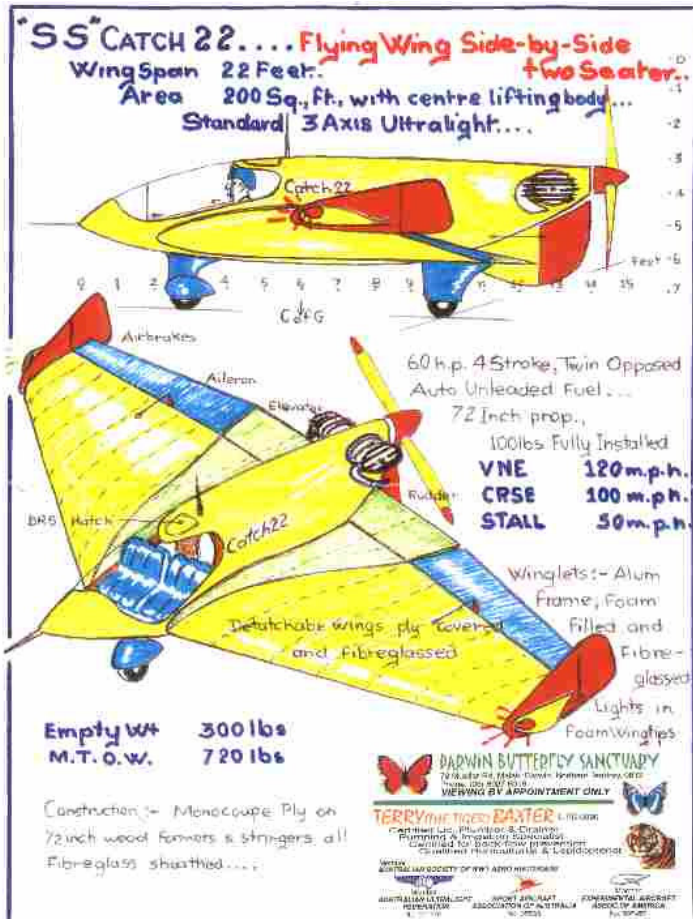
I have flown a number of Zagi models, powered and un-powered, and bigger flying wings with electric podded fans. All quite sensitive to CG changes, but the one and only straight winged flying wing I designed was by far worse!



Much more fun was the Flying Flea-inspired parasol aircraft I flew for a while (above):

<http://www.aricraft.com/tord/flea-attil.jpeg>

With both elevators and in-flight adjustable incidence it had quite spectacular flying characteristics. Sadly it ended up in the top of a tree one day when the engine quit suddenly!



A much taller landing gear is certainly required, to begin with, if thrust vector and wing is fixed! And where will he find such a nice, two-cylinder, four-stroke engine? Never heard of one, but one offs - hardly available! Half a WV engine used to be popular, but I doubt they will give 60 hp, even on a good day!

And that the body would be a lifting body, I see no evidence of, rather the reverse, with a high nose and ditto tail! That might give a bit of an aerodynamic tail load, but it sure isn't lifting!

Like many other would-be designers his aircraft is very complex, and includes a lot of unknowns.

If he can make an R/C version take off and land safely, with a comparable power source, he should by all means go forward! The weaknesses will show up instantly in a model, and they are far easier (and a lot cheaper) to correct in a model than in a full-scale plane! And doesn't involve a massive lot of loss of face, or ridicule, as that can be done away from nosey bastards! Or even life!

If I had a lot of money and was Mr. Terry Baxter I would go to Scaled Composites and say: "Hi! I am Terry, this is my design, please do something of it.

Will try one with a swept wing one day!

A Happy New Year,

Tord S Eriksson
<http://www.aricraft.com/tord/tord.html>
<http://www.foldingkayaks.org/gallery/tord>

(ed. – This was an e-mail after Tord viewed some parts of the website. Great observations on a number of issues. It would nice if more people who browsed the site would offer their opinions and/or insights to some of the designs.)

November 30, 2004

Introduction and questions

My name is Andrea from Ireland. I am pleased to meet you all.

I only speak English, so apologies to readers with other languages, who have bother reading what I say.

I have an interest in the Horton Ho229 and have for a long time toyed with the idea of building a large flying model, with an approximate wingspan of 3 metres, which is the limit which I can get a small plane to land and take of from a small road where I live.

I have tried unsuccessfully to build a small jet engine in the past. The blades melted and the engine spat bits of molten metal in the exhaust before it exploded, so I haven't tried since. That attempt started a major fire in my parents back garden which my parents still annoy me about, hopefully my present partner will be a bit more understanding. I want to learn about jet engines before attempting again. I would prefer to use proper micro jet engines from standing start instead of using a method such as rocket assist to get a ramjet up to ignition speed as I would like to make the model able to land in a fully controllable fashion, under it's own power.

I would like to ask if anyone knows where I can inexpensively obtain plans for a Horton Ho229 or Gotha229, that is designed for two jet engines, I would really appreciate the information. Original plans for a full scale plan I would be able to downsize easily on my PC, it is CAD/graphics orientated. I believe original full scale plans may be best to work from initially.

The other plane design I am interested in is Lippisch P.13. I am particularly interested in the engine design and would like to attempt to convert the design to run on activated carbon, which I believe may be easier to control, as well as being readily available.

Also I am trying to find somewhere to buy these books. Amazon has them listed but every time I order

them they send me an email saying they don't have them six weeks later.

Gas Turbines for Model Aircraft, Kurt Schreckling, Keith Thomas, ISBN: 0951058916 [english language version]

Jet Engines: Fundamentals of Theory, Design and Operation, Klaus Hunecke [english language version]
 ISBN: 1853108340

Any help would be greatly appreciated.

Kind regards

Andrea
 <brownar@eircom.net>

November 30, 2004

I really think you should look into real turbines built for models. Here are a few links.

<http://www.crcja.org/links.htm>
<http://www.swbturbines.com/index.html>
<http://www.bvmjets.com/>
<http://www.amtjets.com/>

However if you really want to built your own, check out:

<http://freespace.virgin.net/cool.stuff/jet/>

But seriously consider using electric ducted fans as they run cooler, quieter, are much less expensive for the more common size models.

Warren Bean
 199 Pine Hill Dr
 Bastrop, TX 78602
 512-303-5631
 <warrenbean@direcway.com>

December 1, 2004

It appears that both you and I were not easy children!

A couple of sites:

http://www.turbomeca.com/public/en/societe/fiche_mic_roturbo.php
<http://www.fiddlersgreen.net/AC/aircraft/Horten-Ho229/horten.htm>
<http://home.planet.nl/~otten100/Ho229PA.html>

<msmprod@optushome.com.au>

December 1, 2004

Welcome to the Horten IX infected group! Eric Van den Hoogen has already built something like you are trying to do. Under

http://www.amtjets.com/gallery_horten.html

you can find additional information.

Regarding plans, there is not so much available as far as I know.

<http://www.bellimelgroup.com/>

will have a set of plans for an EDF one, and I got a set of plans from Bill Young in the states. (byngdesign@infomagic.net).

No idea what your experience on the Horten IX is, however I also suggest to start with the EDF one. Starting with turbines might be a little bit expensive.

Regards,

Daniel
<madcats@dplanet.ch>

December 2, 2004

A Ho 9 with your planed size requires turbines with around 5 kp thrust. For example, Erik Van den Hoogen's Ho 9 has a wingspan of 4,20m and is powered by turbines of 8 kp thrust. And he does not always fly full power. Take a look at www.wren-turbines.com There are drawings and instructions available to build the MW 54 turbine who has the power you require. Also available are all parts for this turbine in the case you are not able to produce a specific part by yourself.

I have German versions of the books from Kurt Schreckling and Thomas Kamps about building small turbines. Because these books are some years old, the turbines described in these books are today a little bit out to date. But for general understanding how these turbines work, the books are still recommended.

About 5 weeks ago I meet Arthur L. Bentley and had a long discussion about his Ho 9 / Go 229 Drawings (<http://www.albentley-drawings.com>). He uses copies of hundreds of original drawings to made his drawings as most perfect as possible. Therefore his drawings are highly recommended to made a scale locking Ho 9.

Take also a look at the Horten Pages in the gallery here: <http://mfc-rhein-main.flugmodellbau.de/>

Greetings,

Manfred Poznanski
<manfred.poznanski@t-online.de>

December 3, 2004

Just curious if anyone knows how washout should be "properly" added to a wing. I don't mean how much should be added (that I understand fine), but rather how the wing should be twisted.

Do you rotate the tip section about the 1/4 chord point (typically how I've done it in the past)? Can you rotate the tip section about the LE instead without changing the effect very much? Does it really matter?

Thanks,

Adam Till
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December 3, 2004

Just a thought: you should twist it about the hinge line of the control surfaces. The hinge line becomes a straight line, which simplifies the hinge and the seal of the surfaces. This way, you maximize the seal (or at least minimize the complexity of the hinges and seals) for the control surface. Leaking pressure from the bottom of the wing to the top of the wing (reducing aero efficiency and control power efficiency) is usually a bad idea...

Reimar Horten always did it that way. So it MUST be a good idea...

Al Bowers
<al.bowers@dfrc.nasa.gov>

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