

# T.W.I.T.T. NEWSLETTER



Article 07 is a model with a variable camber section in an arrangement that may be unique for flying wings. You can see more on this unusual wing and the designer's proposal for a joint project can be seen inside.

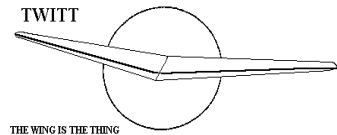
## **T.W.I.T.T.**

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., 0706 means this is your last issue unless renewed.

Next TWITT meeting: Saturday, July 21, 2007, 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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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**

**N**ot a lot to talk about this month. I want to thank Chris Doughty for the nice shots of his electric wing experiment and the short article that went with them. It is always nice to hear about the member's projects, especially when there are pictures to show the results.

We also had some nice letters this month to include and I also found some good threads from the Nurflugel and Mitchell bulletin boards. I liked the one covering the lacing discussion on the U-2 and some of the pros & cons of doing it on a low-speed aircraft. There is also a good technique for mopping up the excess resin you always seem to have when doing layups.

Even though we usually have a anniversary party at the July meeting, I don't anticipate such an event this year. So far I haven't found any type of program and I really don't want people driving long distances just for cake and ice cream (which probably wouldn't have happened anyway). Depending on Doug Fronius' schedule, I imagine we will spend some time doing clean-up work around the hanger getting it ready to consolidate some of the TWITT assets into his hanger, allowing for the other hanger to be taken over by someone else.

I received a call from a potential speaker, but I am not sure if he will be able to do it on the regular day in July. If he can do the presentation on another Saturday later in July, I will get the word out electronically as soon as I know so we can see how many people will be able to make it. I don't want to do a program if we will only have 5-6 people show up due to a date change.



## LETTERS TO THE EDITOR

April 16, 2007

**N**ew method of wing propulsion.

<http://www.vortexosc.com/index.php?newlang=english>

It represents the work of Dr. Sorokodum, Russia.  
Drag decreasing, effective energetics.

With regards,

Henryk Doruch  
Krakow.  
([www.kasperwing.com](http://www.kasperwing.com)).

*(ed. – You really have to look at the link to see what is being shown here since it is an animated display. It is above my head but has something to do with technologies based on extraordinary oscillating, wave and vortex effects. This was the only e-mail I received from him, so really don't have any more to go on.)*

May 9, 2007

*(ed. – I received MRK's initial proposal and wrote back that, "I can tell you I don't think there are any members of the organization that would take on such a project with the level of participation you desire. It has been my experience with this group that they are mostly interested in the theories and would love to see what you are doing, but to be a part of it would be more than they would take on, even just financially.*

*However, I will post your proposal in the next newsletter, which unfortunately won't be published for another month, and see what type of response you get. Can I use some of the photos of the model as shown on the web site you included?*

*To reach a larger audience I will post a link on our web site to your proposal to see if you get any responses that way.*

*You can also subscribe to the Nurflugel bulleting board through [www.nurflugel.com](http://www.nurflugel.com) and post your proposal there. It is a much larger group viewed by people worldwide on a daily basis. There are some very interesting people on this bulletin board so it may well be worth the time to subscribe and post.*

*I am sorry I can't be of more help at the present time, but hopefully our web site post and that on*

*Nurflugel will get you some responses that would be worth pursuing."*

He responded with:

"Ah, the theory people. I started as a theorist, to be honest, but to be honest I've always done a lot of paper aircraft when I was young. I understand what you are saying and thank you for posting the proposal, it will surely help.

You can add all the photos you find on my website, but remark that there is not a single photo of the variable camber wing, which is the object of my proposal. Maybe you're referring to the R/C model "Article 07": as I wrote, it is just a bit off the usual flying wing (those huge flaps are working as speed brakes when deflecting more than about 30°, CI does not increase any further. They are nearly zero pitching moment flaps, though, this is a remarkable issue given their size).

Article 07 is just an R/C model I'm trying to sell for making some money for the true wing for the theory people. You might just forward this preliminary analysis here concerning overall polar envelope of variable geometry foils. Random geometrical changes on airfoils (thickness, thickness highpoint, camber, camber max location, leading edge radius) I did by piping about 180 airfoils into x-foil and post processing the polars with Matlab. The idea is that airfoils on the outer envelope are the ones better performing. I pick up the most relevant characteristics of those foils and try to work a mechanical device for actually doing the variable optimal foil itself.

If you see the actual values of those polars and you are current with polars at  $Re=1M$ , you will notice that the results are quite promising. Later on I embarked in an optimization algorithm, I abandoned temporarily because pressed by more important issues on my project I could go into more detail anyhow. Here are the shots. (See these starting on page 4.)

<http://www.karenfuxia.com/media/penv1a.jpg>

<http://www.karenfuxia.com/media/ClvsAlpha.jpg>

<http://www.karenfuxia.com/media/CmvsAlpha.jpg>

It's all right. At least you exist and you got the point. Not usual lately.

Thank you very much again

mrk  
mrk@karenfuxia.com"

*So here is what he sent as way of an explanation of the project and what he is looking for.)*

Dear TWITT Members:

Thank you for your association.

I am into a personal R&D initiative aimed at maximizing synergy between pilot and flying machine. The airframe is conceived as an exoskeleton to which the pilot's body is fully connected, both in action and in sensation. It is my go at the famous topic.

I have been granted a couple of patents concerning a tactile transposition, and an airframe. I spent way too much time trying to involve and develop these patents with academic or industrial institutions, and I've spent way too much time in compromising with people on side topics. The outcome is zero net, except a friendship developed with Haute-Voltige (<http://www.haute-voltige.com>), which will grant me some exhibition space, once I have the thing flying, and shares a similar vision concerning man and flying machines. Mr Monnet (president of Haute Voltige, former Patrouille de France leader) is far beyond the classic aerial display style. He focus' on something he calls "Aerial Theater" which meets me completely. Or at least, it met me: lately, I'm rather fed up with trying to show people something

The final result is that I reworked the airframe into a simpler one which is happily flying as a scale model: it is a flying wing - and that's why I'm writing you - with a variable camber section, it features an aerodynamic architecture I've never seen before, as well as for the variable camber mechanics. The whole wing is directly issued from a prone pilot architecture, flying in what I call "bilateral" correspondence (left side of pilot limbs controls left side of aircraft, and correspondingly for the right side). I have done simulated and real trials aimed at evaluating the "pilotability" of similar architectures and the results are incredibly natural.



The wing is made of a few parts conceived under no frills and no small parts hardware. It maneuvers astonishingly well (turns on a dime, yaws across full 360° while maintaining flight path ("tete-queue"), rolls at more than 360°/s a hair off stall speed, pancakes (post stall) with no flaws, even deeply) it features a pusher propeller and lands on a high alpha attitude.



The aim is making the wing under no fuss and fly the hell out of it. At the present time, I don't care to show it or make money out of that, I just want to fly the damn hell out of it. When I will calm down, if still alive, I will consider "normal world" options. I'm quite fed up with compromises. Now you can think I'm too nervous or aggressive for flying, I assure you that I have my dose of flying and full respect of the aerial environment. It's just the terrestrial dynamics and sharing every days life with people not helping you that sucks this aggressivity

I'm building up the money and the competences to actually make the wing (it will be composite for the outer sections, rudders and L/G, slightly more conventional for the inner sections) but it is a lengthy progress. Every now and then I come across somebody promising me some help, which is good, but I feel that all this lacks a unity and a straight-forwardness: I'm writing you to improve this point.

Beside hitting on the anvil myself up to when the thing comes out, I'm seeking for someone dead determined like me, sort of life or death matter, which marries the idea of bringing a "new generation" wing+pilot into the air, and sets down full hands with me.

The basic thing I seek on TWITT is a personage you may locate which features similar no-compromise characteristics and either has the money or the competences on composite construction. I don't seek for a joint program with a lot of heads popping in. I don't seek for collaborations and divulgation of the project as it is. In the future, everything you like, but now I want to see a couple of eyes in front of me where I read dead determination, and I read that those eyes got the pilot-and-machine ultimate trip. We shake hands and get on the work restlessly until it's done, and share the outcomes. I can come live where those

eyes are, but I should find some basic resources to make ends meet. In addition to carbon fiber, resin, a propeller and an engine, I just need a bed and 2500 kCal per day.

as before (which is to say, we couldn't care less one of the other).

I'm sorry for the overall tone, but it is fundamental to lay the thing on this tone. I cannot stand a single "rentability" word said. I cannot stand small or large entrepreneur style speeches. I cannot stand people who have not the guts to be themselves and turn around the pot of "it would be nice, etc.", I cannot stand smiling faces saying they can help in their spare time, which never happens. I cannot stand people saying they help me by proposing side initiatives. I want somebody like me who got the driving force and works with me or lay down the money, so we are two, and two is more than one. Otherwise, I'm me myself and I will make it myself. as I've done up to now.

Thank you very much for your time insofar

mrk

PS: For the usual coordinates providing I have a history and some reliability, you can download my CV

<http://www.karenfuxia.com/publishing/mrkcv.pdf>

visit the projects section on my website <http://www.karenfuxia.com/projects/projects.htm>

(the "masterblaster" is the contraption, though the info is out of date. The "Aerodynamic Smart Skin System" is the tactile transposition I said before) see my last R/C wing I'm trying to sell to pile up some money (the wing has nothing to do with the variable camber prototype)

<http://www.karenfuxia.com/articles/article07/article07.htm>

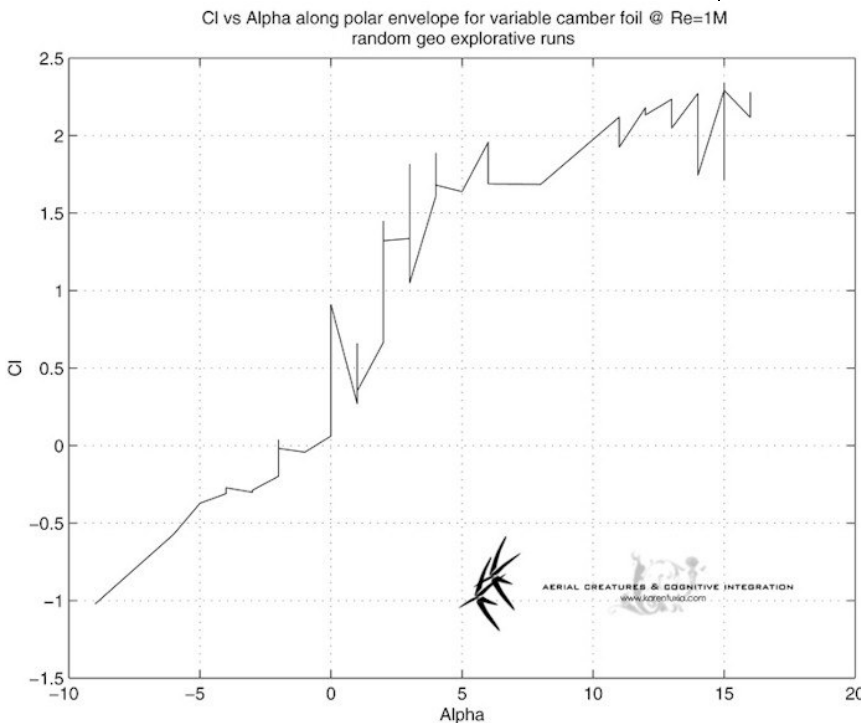
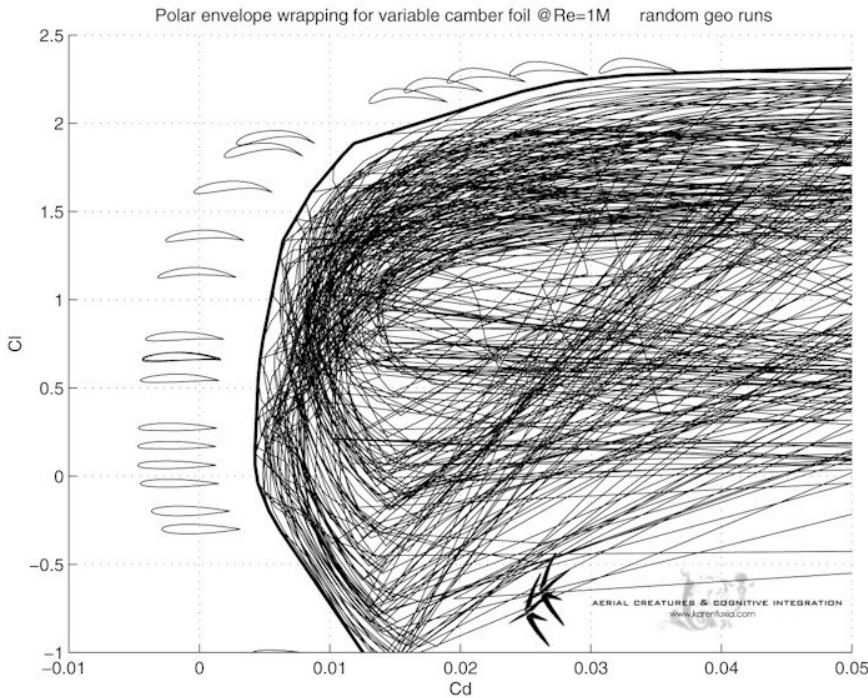
there's a video you must download showing some flight style and flap hovering,

<http://www.karenfuxia.com/media/a7xs.avi>

or just visit my whole website

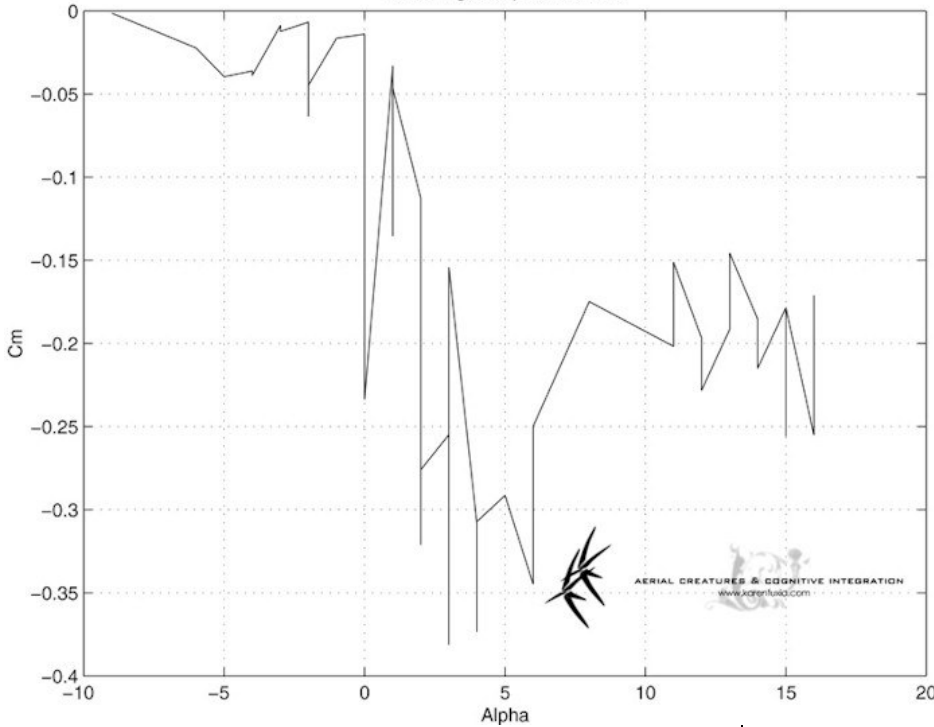
[www.karenfuxia.com](http://www.karenfuxia.com)

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Aerial Creatures & Cognitive Integration  
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Once you locate somebody with the guts and characteristics I provided, I will provide him (or her) further technical information concerning my wing, under a non-disclosure agreement optics. He (she) will then decide to go on or not, and, if not, we stay friends

Cm vs Alpha along polar envelope for variable camber foil @ Re=1M  
random geo explorative runs



May 10, 2007

**T** here is some actual Horten footage on You Tube. Once you are on this page there are also some other links.

It looks like some of the video is from a German TV documentary about the restoration of the Hortens for the Smithsonian. I wonder if anyone knows how to get the entire original video.

<http://www.youtube.com/watch?v=Z8KnoEcsM94>

Regards

Kevin Renshaw  
<kevin.j.renshaw@lmco.com>

*(ed. – I have made some inquiries to see if there is a possibility to obtain the entire footage. So far there has been no progress, but I will keep you advised.)*

May 12, 2007

Bob (Hoey):

**I** ran across your bird models on the TWITT site a while back. I am just e-mailing to tell you how much I admire what you have done. Great job. I fly simple rudder/elevator discus launched gliders. The shot of your vulture flying with ravens is great. Anyway, that is it. Thanks for sharing via the website.

Bob Brown  
<http://www.bbbrown.com/>

May 15, 2007

**I** sit here in awe of Mr. Horten. As a young boy and also in my early teen years during the turbulent war years, I built small balsa wood hand launched gliders. As I can recall; I had built several small flying wings. One was slightly swept, and the other was of the gull design, and also slightly swept with a fence at each wing tip. I never pursued it further than that, due to economics. We were a poor family with a widowed mother.

I have enjoyed the websites which show the Horten's work. Thank you very much for your website work.

Best wishes,

Robert Richards  
<inge@webcosolutions.com>

*(ed. – We are always glad to hear that the items we have on the web site are appreciated. I will try to get back to work on it in the near future and get rid of any bad links and add some new ones.)*

May 18, 2007

**I** have here some photos and a short write-up if you are needing articles for the next TWITT newsletter. It is about that high aspect ratio glider that you published a progress picture of a month or two ago. I have since completed and test flown it successfully. See below:

#####

You may remember seeing a small sketch and a progress photograph a month or two ago of a high aspect ratio built up glider I have been working on for the last little bit. Well, it is finally completed and test flown. This has been my most ambitious design project to date (but certainly there is more to come!)

The wing is built up with conventional building techniques. It uses balsa ribs, with an upper and lower spruce spar. The ribs on the inner, non-tapered panel, are carbon capped both top and bottom. Covering is

transparent Solite film. Six servos sit inside the thin wing to control six independent flaps across the entire span of the wing (notice how thin the wing is in the picture of it flying edge-on). I have included a picture of how the mixing is performed to get the desired controls. Being the first project I have programmed for mixing on my radio, which proved to be quite a challenge, perhaps not the easiest example to start with!

For power I am using a brushless outrunner motor and a three cell lithium polymer pack. Both these are grossly overweight for the model, and a better center of gravity location and lighter wing loading will improve flight characteristics still further when my new equipment arrives.

Flight characteristics so far have proved extraordinarily good, being very stable and tracking well, even in turbulent air.

I am still in the process of wringing it out at the local club, so I am hoping I will get some good flying in with it this summer.

SPECS:

- Wingspan: 60"
- Root Chord: 5.25"
- Tip Chord: 3.6"
- Leading Edge Sweepback: 31 degrees
- Airfoil: RS004A
- Twist: 4.5 degrees
- Controls: aileron, elevator, flap, spoiler, and throttle
- Servos: Blue Arrow 4.6g X 6
- Receiver: Sombra Labs 7channel synth.

Cheers

Chris Doughty  
<chris.doughty1@gmail.com>

*(ed.- Thanks for the update Chris.*

*I have included the pictures Chris sent along. This is what it is all about with people out there trying new ideas and sharing that with the rest of us.)*



May 20, 2007

To: Chuck Bixel & TWITT:

I need no convincing of the merits of flat airfoils and low ARs for WIGs, but to run a boat at high speed in extreme ground effect is considered a dangerously unstable thing without tandem wings. Do you mean to suggest that I may safely use an ultra-low AR monoplane and rely upon the CP transfer to correct excessive pitch, without crashing into the water, when operating as low as 10% of wingspan? High pitch oscillation would surely result in a crash.

With this much lift I could build a slalom ski boat that would fly at 40 mph using all-hydro control surfaces and drive. Zero wake, good fuel economy, surface-piercing drive, top speed out-of-sight and unattainable without air control surfaces. Cheaper than hovercraft and as cheap as a hydroplane.

I've never seen anyone ski behind a WIG. Do I understand your implications?

Jim Short.  
<jimshort19@hotmail.com>

*(ed. – I don't expect we will see a reply from Chuck since he is no longer a member and hasn't included TWITT in any responses in the past. The writer does present some interesting concepts that would probably meet public resistance due to the craft not conforming to their perceptions.)*

May 25, 2007

I have been looking for a retiree, Ron (Ronald) Taborek, formerly with Ontario Hydro, now resident of Guelph, Ont.

I got this as a lead, if you know Ron, please help me to locate him. E-mail address would be appreciated.

Andy Hubert  
<nyuk@sympatico.ca>

*(ed. – I wrote back to Andy and told him I would post this in the newsletter and also on the Nurflugel bulletin board to see if either group could come up with contact address for Ron.)*

***Nurflugel Bulletin Board Threads:***

**Atos Cage**

**Hi** I found these pictures in the German magazine "Flügel der Welt" (wings of the world).

<http://www.flying-pages.com/fluegel/new/img/Seite9.pdf>

Technical data  
Wingspan: 14m  
Best glide ratio: 25

Best wishes,

Jörg Schaden  
<Joergs-doppelraab@gmx.de>

*(ed. – I have included three pictures I extracted from the PDF file. I don't recall having printed pictures of this flying wing before, but there is obviously a prone pilot seen in the center picture.)*



**8-229 List Of Drawings**

I am currently working on a list of all the Horten H IX / Ho 229 / 8-229 drawings from the Deutsches Museum archive's microfilms. Now that I am around number 1760 I wonder if it might not have been easier to simply ask you guys if someone already has created such a list, preferably in an Excel compatible format. It should at least include the part number (8-229-Number) and the title of the drawing. So if anyone has



such a list, please send it to me. Otherwise I will finish my list and offer it to anyone from this group, I might even upload it to the files section - when it is finished.

Maik Swoboda  
<ErzwoD2@hotmail.com>

Maik,

I am pleased to hear that you are preparing a list of Horten drawings and would very much like a copy when you are done.

Does the Deutsches Museum Archive allow copies to be made of the plans? It would be great if we could one day see an electronic or microfilm copy available to the public.

Mark Cowan  
<mdc22003@yahoo.com>

Mark,

The Deutsches Museum does copy the original drawings, but these copies are expensive. But they also have two microfilm reels with all the plans and you can make copies via their reader printer. DIN A 3 copies cost 50 cent (Euro) A 4 copies 25 cent, but in most cases the drawings are too large for A4 copies. The bad news is, that you have to go there and make the copies by yourself. And they do not copy complete microfilms, like the NASM does.

Maik

Where is this Museum, which one are you referring to, the Munich Museum or the Deutsches Technical Museum in Berlin.....

Huckebein (still working on the REAL Me262)  
<milartjj@aol.com>

I hope in Germany because then I can see what relatives of my family have built not the original but a nice new one.

Jörg Schaden

It is the Deutsches Museum in Munich

<http://www.deutsches-museum.de/en/>

Maik

Hi Maik:

I am afraid I can't help you with the list but keep up the good work! I do wonder why you are compiling this list. Are you planning a publication on the Ho 229 or is it just personal interest? By the way: Thanks very much for the positive review of Horten Ho 229 "Spirit of Thuringia" by Andrei Shepelev (and me) on Amazon.de. Highly appreciated!!!!

Nurflügel Forever!

Huib-

Hi Huib,

Currently this is more personal interest because I am trying to build a half stripped down scale model (which might lack a lot of those details because of the small scale). I do not exclude that I will try do make some kind of publication sometimes in the future, just because all this research effort should not be lost in my desk's drawers and one scale kit.

But I think currently there are enough publications, so it makes no sense to write a new one in the next few years. During my research I saw that especially German archives are not very much up to date and the service there is far behind the service of the NASM archive's so I think tools like this should also be welcome by other Horten researchers.

Maik

### Deutsches Museum Nurflugel Exhibit Pics

Here are some pics I found on the museum exhibit.

Chad  
<mtoreceptive@yahoo.com>

<http://www.flickr.com/photos/oandreas/5918812/>

<http://www.flickr.com/photos/oandreas/5918805/>

<http://www.flickr.com/photos/oandreas/5918794/>

<http://www.flickr.com/photos/oandreas/5919081/>

*(ed. – I have included a couple of the pictures from the above links on the next page.)*



**Northrop Feature in Aeroplane**

The Aeroplane <http://www.aeroplanemonthly.com/> (my favorite mag) has a feature on Northrop flying wings this month. I have not read it yet. I save it to Monday where I have a 10.5 hour flight in a wide body yuck. But the pictures are great.

Sez il  
<ilafe@rocketmail.com>

*(ed. – There weren't any pictures linked on this page, so I imagine you will have to buy the magazine at the book store or subscribe to read this article.)*

**Horten Ho VI Drawings**

Does anyone know where I could find drawings for the Horten Ho VI? I have searched the Internet with no results.

Chris  
<chris.doughty1@gmail.com>

**Mitchell U-1 Bulletin Board Threads**

**Rib Lacing on the U2**

Hi Group,

I am nearing the time for covering and have been doing some reading on the subject. Have any of the wing flyers laced the ribs? I would like some inputs.

Thanks

Russ  
<ghgidf@yahoo.com>

Hi Russ and all,

I recovered my U-2 few years ago because the (wrong) paint I put was peeling off. I decided to rib lace and rib stitch...Why? No specific reason besides getting experience for my next project, it does also rigidify those thin ribs as the Ceconite does not go around the leading edge. I doubled the joint width on the leading edge cause this ain't a standard procedure not to go around the whole wing but if I look at the first covering I had .It never seemed to peel off the leading edge...Overall cost to do it is about 100 \$ and it is and easy job after you mastered the knots...

Guy  
<guy.provost@sun.com>

Hi Guy,

Thanks for all your help on this and in the past. I to think I will lace mine, for no other reason than it looks better laced and I already have the lacing and needles. Now some practice tying knots.

Thanks again

Russ

Russ,

I am planning to lace "Tom's U2", but maybe not to the strictest standards. The perfectionist builders of composite aircraft use the same lightweight Dacron fabric on top of their layups to soak up the excess resin. After the resin is cured, they peel it off---hence the term "peel ply". It doesn't inspire confidence in its ability to stick to a 1/4" rib under peeling loads.

Dave Gingerich

< dgingerich@cox.net>

Hi Dave,

**N**ever heard of the phrase "peel ply" and don't at all understand. Can you help more in any way? I am very near the point of lacing and am looking for all the help I can get.

Thanks

Russ

Russ,

**S**ave all your fabric scraps when you are covering. Then, whenever you make fiberglass fairings, nose bowl, cowling, etc., you can use them as "peel ply." Usually, you lay fiberglass over foam or a form and then soak it with resin, either polyester or epoxy. If you press the fabric scraps into the surface on top of the resin, it will soak up some of the excess. After it has hardened, you can peel it off. This leaves a nice surface, ready for another layer of fiberglass or for filling and sanding.

When you see how easy it is to peel off, you get concerned about the fabric sticking to ribs.

Lacing is kind of fun, but it bothers me to think of all those yards and yards of string going up and down. I am considering lightweight staples, or trying to tie around the top capstrips.

By the way, where are you located?

Dave G.

Hello to all,

**J**ust a few additional words about lacing. Another possibility to improve the bonding of the fabric to the structure, essentially to the ribs, might be the use of extra lengths of wood, typically of a width of 1 inch, glued on top of the rib (in fact on the face where the fabric is supposed to be bonded). As such, there would be a nice streamlining between the gusset on the spar and the gusset on the trailing edge. Of course such a method adds some weight, but it is possible to use lighter wood than birch plywood. Okoume plywood can be a nice solution.

Best regards.

< pleconte@neuf.fr>

PS : When manually soaking composite plies with resin, it is quite easy to put really too much resin,

increasing significantly the weight of the part. A peel ply installed manually can greatly help, as can also vacuum bagging (can be made quite easily with a vacuum cleaner). In doing so, you use not only a peel ply, but also a perforated ply applied on top of the peel ply and then a felt ply which also pumps quite a lot of the extra resin. The result is a "dry" composite part, keeping in mind that most of the strength of a composite part comes from the fiber material (glass, carbon...) and not from the resin.

Thanks Dave,

**T**he peel-ply sounds interesting, never thought of it. You could call me a New England Yankee because I never throw anything away until I have so much junk I cant find anything. Then it's time to clean house.

I am located in NW Ga. about half way between Chatanooga and Atlanta, have been here for about 6 yrs. A NW FL transplant.

Talk to you later. Thanks

Russ

**I**t is always good to use the traditional method of rib stitching and running the covering material all the way around the wing.

Don built the B-10 and the U-2 without doing these things. He said that an airplane that flies under 100 mph does not require stitching or full wrap. We have never had the problem of the fabric coming up.

I do like the idea of using 1" 1mm cap-strips on the top of the center section ribs . We did use two good coats of super seam however. I like 2 to 2.7 oz material and a model airplane heat gun for tightening the material.

Does anyone know of the method of using a good house for painting our wings??

Richard Avalon

< mitchellwing@earthlink.net>

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**Edition 1-f**, which is sold out, contained over 5600 annotated tailless aircraft and related listings: reports, papers, books, articles, patents, etc. of 1867 - present, listed chronologically and supported by introductory material, 3 Appendices, and other helpful information. Historical overview. Information on sources, location and acquisition of material. Alphabetical listing of 370 creators of tailless and related aircraft, including dates and configurations. More. Only a limited number printed. Not cross referenced: 342 pages. It was spiral bound in plain black vinyl. By far the largest ever of its kind - a unique source of hardcore information.

But don't despair, Edition 1-g is in the works and will be bigger and better than ever. It will also include a very extensive listing of the relevant U.S. patents, which may be the most comprehensive one ever put together. A publication date has not been set yet, so check back here once in a while.

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

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Cost: \$10.00 postage paid  
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**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  
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**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.

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