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THE OFFICIAL VOICE OF DRAGONFLY BUILDERS AND FLYERS ALL OVER THE WORLD

DRAGONFLY BUILDERS AND FLYERS NEWSLETTER

Field of Dreams Fly-In

Another Tandem Wing Field of Dreams Fly-In is in the history books. The 14th annual event was held at Sullivan, MO from 24-26 September 2004. The weather was great for the event and once again Sullivan Regional Airport proved to be a perfect location for our event. I want to sincerely thank everyone who came out and supported the event!!! It does require some work to put an event like this together, but it makes it all worthwhile when I see your smiling faces on the ramp. It can be difficult to find a project or flying plane to look at in your local area and it might not make good sense to travel a state or two to maybe see one guy's project in his garage. On the other hand.....when you can come to an event like this and see a bunch of tandem wing planes (14 if you count my MK-III project) and put some faces with the names you hear on the list, it can be a very cheap investment in your plane building process. THANKS for coming to the event

The few weeks before the fly-in were very hectic for me. I had been working long hard hours trying to get my Dragonfly MK-IIH (N41GK) flying before the event, not to mention trying to organize a fly-in. There is no way I could have gotten everything done at the event without some really fantastic volunteers, not to mention Jill's (my wife) help. Jill was a real trooper with everything. She spent several late nights with me at the airport getting the plane put back together – I could not have done it without her help and support. I hate to start mentioning names because I know I will leave someone out, but thanks to all the people who helped before, during, and after the event.

I also received several generous donations. I know you guys do not donate things for recognition (in fact most of you would prefer to not even be acknowledged), but please know that I really do appreciate it. I would also like to thank Pat Panzera and Contact Magazine for supporting the event with those really slick lanyards and nametags. Pat really does a great job with Contact Magazine and I would highly encourage each of you to subscribe. The sample issues went like hot cakes!!! More information on Contact Magazine can be found on the internet at http://www.contactmagazine.com

My theme for the event this year was “Less is More”. Last year I tried to cram a lot of forums into the 3 day event. Several of the forums ran long and it was like we were working at a job keeping everything in line. I know that we learn more at these events by talking to the builders and looking at their planes, so I greatly simplified the schedule of events this year.

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We did a hands on composite construction class on Friday again this year and I am pretty sure the final count was 9 participants. Drew Aurigema, and his building partner Rich, Drew's father-in-law, and one of his friends drove all the way from Florida in an extended cab truck pulling a monster 5th wheel travel trailer on Wednesday before the fly-in. Me, Rich, and Drew got things ready for the fly-in on Thursday and we even transported my MK-III project over to Sullivan. Everything was looking good……enter Hurricane Jeanne.

Pilots Who Flew Their TW Plane to the Fly-In

Name	Plane	Hometown
David and Diana Bourque	Dragonfly MK-II	Abbeville, LA
Charlie Johnson	Dragonfly MK-II	Ogden, UT
Steve Laribee	Dragonfly MK-II	Charleston, IL
Rich Werner	Dragonfly MK-I	Chesterfield, MO
Jeff and Jill LeTempt	Dragonfly MK-IIH and Dragonfly MK-III Project	Rolla, MO
Bruce and Joanne Crain	Tri-Q200	Enid, OK
Sam and Sandy Hoskins	Q200	Murphysboro, IL
Paul and Roy Fisher	Q200	Taylor Ridge, IL
Doug Humble	Q2	Omaha, NE
Terry Crouch	Quickie	Bettendorf, IA
Ernest and Donna Martin	Tri-Q200	Arden, NC
Keith Welsh	Quickie	Marshall, IL
Lynn French	Tri-Q200	Broken Bow, NE

While I was driving home from Sullivan Thursday evening after I took Charlie over to his hotel, I got a call from Jill on my cell phone. Drew and crew were heading back to Florida early Friday morning to get ready for the hurricane. It was not so much that they needed to get ready, but if the hurricane was actually as bad as the weather forecasters thought it would be they may not be able to get back to their homes for a few weeks.

Drew was going to be the primary instructor for the composite construction class so this kind of threw me into a frenzy. The class is an introduction to composite construction so I could teach it in my sleep, but I was counting on Drew's help as

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a mad rocket scientist. Once again, Charlie Johnson stepped up to the plate and hit a home run helping me with the class. I think everyone who participated in the class thought it was definitely worthwhile. We did some hot wire foam cutting, worked with different kinds of fiberglass cloth, urethane and polystyrene foam, and got our hands dirty working with epoxy. Drew donated lots of supplies for the class – THANKS Drew!!!

Performance Run Results

Name	Plane	Speed (MPH)
Sam Hoskins	Q200	192.8
Ernest Martin	Tri-Q200	184.0
Bruce Crain	Tri-Q200	165.7
Lynn French	Tri-Q200	157.8
Charlie Johnson	Dragonfly MK-II	136.1

On Saturday the formal schedule of events included the performance run, the Q forum, the Dragonfly Forum, and the awards dinner. The Q and Dragonfly forums were each scheduled for 2 hours and this gave everyone time to visit and learn a lot about each other's plane/project. This less hectic schedule worked out great.

We used the same 101 SM course for the performance run again this year except we ran it in the opposite direction due to the active runway at Sullivan. I really hoped we would have had a few more participants….maybe next year. Speeds were a mixed bag from last year. Charlie's speed stayed about the same as last year (137.519 in 2003). I did not participate because as of the fly-in I only had about 5 flight hours on the plane since I did all the modifications. Look out next year!!

Everyone who saw my landing practice with David on Saturday afternoon can send me $1 to help replace my severely soiled underwear (probably David's also), heck I may even need Jill to replace my seat due to a contamination problem. The good news is I learned a lot about landing and also learned that David is a great pilot. I went out on Sunday morning and flew about 1 hour doing take-off and landing work. Sunday afternoon after talking to Bob Johnson, Sam Hoskins, and a really nice guy who flew in a little blue bi-plane from Festus, MO for lunch, I probably did 15 more traffic patterns and I think I am getting the hang of it - THANKS SAM!!!

The awards dinner was really nice on Saturday evening. I learned from last years event and reserved the Sullivan Community Events Center for a couple of extra hours so we could stay longer and talk about airplanes, imagine that. We had about 70 people attend the dinner and there was plenty of food, no one went home hungry.

Award Winners

Award	Name
Longest Distance Traveled in a Dragonfly	Charlie Johnson
High Time Dragonfly	Charlie Johnson
Best Dragonfly Cockpit	David and Diana Bourque
Best Overall Dragonfly	Jeff and Jill LeTempt
Longest Distance Traveled in a Q	Ernest and Donna Martin
High Time Q	Sam and Sandy Hoskins
Best Q Cockpit	Terry Crouch
Best Overall Q	Ernest and Donna Martin

Sunday morning was pretty typical for the last day of the fly-in. Most everyone was on their way home before lunch. There were a few maintenance problems that were being worked on. On Saturday afternoon David Bourque's MK-II was not developing full power during take-off on an orientation flight. He started tearing things apart and found a burnt valve. Sunday morning with the help of Phil Schloss, David

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got everything repaired and he and Diana headed back to Louisiana.

In my mind the event was a huge success. Of course I would have loved to have more people and more planes, but there will always be some scheduling conflicts. Next year the event will be held from 23-25 September 2005, so mark it on your calendar. There is some discussion taking place about the location of the event, but I can tell you with 100% certainty it will be held somewhere in the middle of the US. I think it is good to move the event around once in a while to maybe get a few new people interested in our tandem wing planes. Of course I welcome your comments and suggestions.

Jeff

Jeff LeTempt's Dragonfly MK-III
Photo by Ted Forringer

Charlie Johnson's Dragonfly MK-II—Longest Distance Flown to the Event in a Dragonfly and High Time Dragonfly. Photo by Sam Kittle

David Borque's Dragonfly MK-II—Best Dragonfly Cockpit.
Photo by Spud Spornitz

Rich Werner's Dragonfly MK-I
Photo by Spud Spornitz

Jeff LeTempt's Dragonfly MK-IIH—Best Overall Dragonfly.
Photo by Spud Spornitz

Steve Laribe's Dragonfly MK-II
Photo by Ted Forringer

Dragonfly Serial # 001—The Prototype

You ever wonder what happened to the original Dragonfly prototype serial number 001? I am happy to report that it is alive and well in Busby, MT owned by Joe Henze. Joe sent me copies of a few airframe logbook pages and that makes for some interesting reading. The registration number was originally N5WM, but at some point it was changed to N30532.

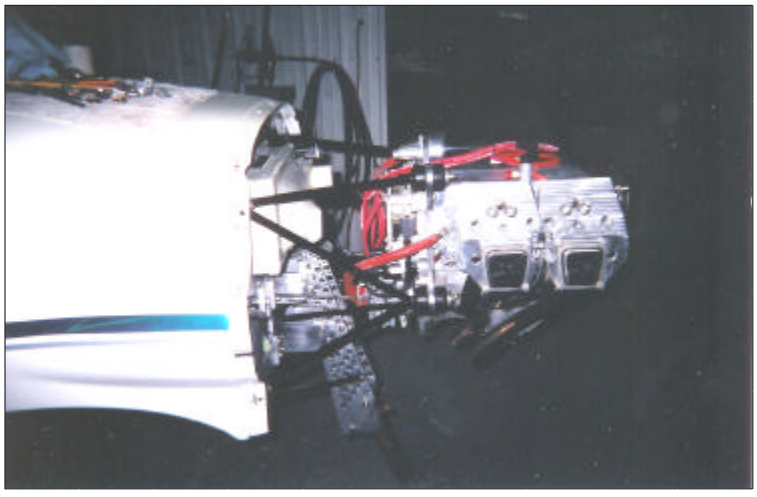
On June 19, 1980 the aircraft was inspected by the FAA and received its airworthiness certificate. The plane was first flown by Bob Walters on June 20, 1980. with a 1600 cc type 1 VW engine. It looks like the initial propeller was a Props Inc. 52x42, but it was changed out after four flights for a 52x36 propeller. The plane was flown almost every day in late June and early July of 1980 and had completed the 40 hour phase 1 test flight period (actually had 42.5 hours) on July 8, 1980.

Rex Taylor received a check-out and purchased the airplane with 215.9 hours on August 6, 1982. By June 13, 1983 the aircraft had logged 391.7 hours and that is where the flight time stopped. Annual conditional inspections were completed every year until 1987 and Patrick signed off that last inspection on July 25th of that year.

Apparently Slipstream Industries received the prototype when they purchased the rights to the plans. Al Stone, a draftsman and mechanical engineer from the Chicago, IL area took ownership of the prototype from Mike Puhl (Slipstream Industries) in exchange for developing a MK-III conversion and making new computer generated plans for the Dragonfly.

The plane, now as a MK-III, was the Dragonfly on display at the Slipstream Industries booth during the EAA AirVenture 2001 at Oshkosh (see DBFN 92 for a full report). The plane had not yet been completed, but was being marketed at the Millennium Edition Dragonfly.

About a year and a half ago Joe traded Al Stone a Corvette project car that his high school industrial arts class was building and some cash for the airplane. Over the last year and a half Joe has been working to get the MK-III back in airworthy condition. On September 30, 2004 the plane was flown for the first time (in a long time) by Lou Ruby from Sheridan, WY.



The flight went off without any problems and only a minor elevator adjustment was required to correct a heavy wing condition. The plane has the Jabiru 2200 installed and the nose wheel is from a BD-5. Joe is currently looking for a new more heavy duty nose wheel because the BD-5 unit is not quite up to the task. The plane currently tips the scales at 705 pounds.

It is great to see the old girl still alive and kicking. Joe is originally from Doniphan, Mo and he hopes to fly the plane there next summer. Maybe we can talk him into attending the 15th Annual Tandem Wing Field of Dreams Fly-In!!

Patrick Hildebrand Goes to OSH

First visit for C-GKPG to Oshkosh—By Patrick Hildebrand

On July 17, 2004 I started the journey to OSH. Although, I could have made it easily in one day, circumstances and family events allowed me to prolong the adventure and this was fine by me. This would be my first long trip with the Subaru EJ25 engine and new oil cooler. The first leg would take me to Medicine Hat Alberta. Departing Cooking Lake airport near Edmonton at about noon, the temperature was about 70 degrees. I cruised at 8,500 feet truing around 160 knots. An hour and twenty minutes to go 223 nautical is a nice short trip, you're still fresh when you get there. I knew the departure from Medicine Hat the next day would be a good test for my new oil cooler.

After a 50th anniversary celebration for my wife's relatives, I departed Medicine Hat the next day at around 1:00 pm. The ambient temperature on the ground had already risen to about 102 degrees. I was a bit concerned about my sustained climb at that temperature. With full fuel on board (about 24 us gal) I departed on runway 09 for my next destination east 500 nm away. Climbing up 10,000 feet from my departure field level, I closely monitored my oil temperature and was pleased that it never went over 210. It took my little Dragonfly just under 20 minutes to get to 12,000 feet. The temperature at altitude was a nice comfortable 66 degrees. Running my $150 oxygen system, 12,000 to 14,000 feet is the perfect altitude for my Dragonfly. Just like the Olympic motto, higher and faster. The turbo-charged engines are amazing at high altitude. My true airspeed at 12,000 feet was 180 knots. I saw groundspeed vary between 185 to just under 200 knots in glassy smooth air…..this is really living. The dream had to pause after 2 ½ hours of flight time to Winkler Manitoba.

Winkler is such a hospitable town. The airport there has a great group of enthusiasts and gentleman fliers. The mayor is a wonderful man and a good friend of our family. He allowed me to park my bird is his hangar for the week. The plan from Winkler was to have my friend from Edmonton meet me there with his Long-EZ. We were to fly as a group the next week to OSH, however high oil consumption on his engine meant he had to cancel the trip. Going alone, I was determined to get my Dragonfly to OSH. I'd come this far so I felt I had to make the effort to go the distance.

I departed Winkler at around noon (again). I always like to declare customs as soon as I can when flying to the US, that way if I have any urgency (weather, full bladder, or engine) I can land without complication. I stopped at Pembina (PMB) to take care of customs. After that I filed for Rush City, Minnesota (ROS). After 1 ½ hours I landed at ROS thinking that this has been a pretty uneventful trip. I'd be in OSH by early afternoon, earlier than I've typically arrived with my other airplane. After landing I found that my trip would be a bit more challenging.

After pulling up to the fuel pump, I did a thorough inspection of my airborne chariot. The belly and radiator revealed oil residue. Not a severe leak but oil coming from somewhere. After pulling the cowling I found a leak on my new oil cooler fitting. Now how am I going to fix this? All my specialized tools and supplies were at home. One of the things I love about aviation is the people. I met a gentleman operating a flight school and although he didn't have everything I needed, he loaned me his car to drive into town. The local Bumper to Bumper had everything I needed and in about 2 hours I had everything fixed and ready to go.

A beautiful evening to arrive at OSHKOSH with scattered clouds and comfortable temperatures around 80. I arrived over Ripon as per the NOTAM. The exciting part this year was the option to arrive at the higher 2,300 foot altitude. It

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is reserved for aircraft approaching at 135 knots or faster. After a long day, I was delighted to be able to buzz in at higher speed. There were no other airplanes at that altitude so I approached the waypoints still doing around 140-150 knots. It was satisfying to see all those airplanes below me at 1,800 feet plodding along at 90 knots. I was welcomed at checkpoint FISK and cleared for runway 36L. High speed jet traffic went by me overhead and I was on the approach for OSH.

After landing, air traffic control thanked me for coming and I was cleared for the taxi right in front of the show line. It was pleasurable to have all those fellow aviation fans watching me taxi in, I felt like a celebrity. All the volunteers at the show make you feel like royalty when you arrive at the show. They parked me with a gaggle of long-EZ fellows beside some Q2 owners (nice people). The welcome wagon was quick to help me tie down and they shuttled me to the lodging office.

The next day, after a great breakfast, I was eager to enjoy the show. After roaming around for part of the day I returned to talk with some Dragonfly and Subaru aircraft engine builders by my airplane. The usual routine is to pull off the cowling and justify why I built it that way. It's funny when I explain components of the engine installation. I always do yet another inspection, you builders/fliers are probably the same way. We continue to scrutinize our construction indefinitely. In this case, my inspection revealed some ripples in the base of the propeller blades. To my dismay, the prop blades were failing.

I immediately sprang into action. One of the many wonderful things about OSHKOSH is that most every who's-who in aviation is there. I located my propeller expert and manufacturer and we began searching for answers. The prop manufacturer (Warp) was wonderful in working with me to understand the problem. They rushed in another set of blades for me on warranty, however, this propeller problem definitely overshadowed my fun at the show. I didn't take in one airshow performance except from a distance. I spent my time coordinating the repair and the rest of the time worrying about it (which didn't help any).

A couple of days later, the propeller blades arrived. The repair station was very helpful in providing an assistant and the tools necessary to do the replacement. I got it back together again and had it ready for flight. Once I had the engine running and departure team in place, they flagged me to the taxiway. They had to hold up a P-51D Mustang to let me pass. This is Oshkosh, homebuilt airplanes are like royalty. They held up traffic every time I came to an intersection all the way to the active. It seemed like seconds and I was on my way home.

The trip back to Winkler (about half way home) was subdued, I throttled back a bit. After stopping at Rush City and Piney, I arrived in Winkler in the evening. My father met me and he had already been praying for my safe return. After talking briefly, we inspected the airplane only to find that the propeller blades had developed new cracks.

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After a couple days in Winkler and much prayer and supplication, I left it all in God's hands. We determined that I would fly the airplane the rest of the way back to Edmonton, even though I knew the blades were failing. I took a bit of pitch off the propeller and ran at lower power settings. My last leg of the trip was about 3.5 hours (saved the longest for last)…..I was never so happy to get home.

After much discussion and research we concluded that the propeller blades were failing due to a number of factors, the light weight of the low inertia blades, the engine did not have a fly wheel, the short stroke and high compression, and the high combustion impulse is large to attain 140 HP from such a small block. The blades were flexing due to this impulse.

I ended up switching to a two-blade wood propeller on the recommendation of some of the Q2 friends I made at Oshkosh. I also retarded the ignition timing to smooth out the pulse and I'm pleased to say that this has made a big difference. The wood prop might be a bit slower (perhaps 5-7 mph) but I like having the peace of mind.

Since the propeller replacement, I have taken a number of trips and so far it has held up perfectly and seems to operate smoother. I've had it all the way to 16,500 feet and cruised at 4,000 RPM direct drive. Everything seems OK with no signs of fatigue and I'm looking forward to another trip to a major air show.

Canard Contamination—Part 1

by Andrew Aurigema and Jeff LeTempt

I was not standing right there when it happened so the detail may not be 100% accurate, but here is how the story goes as I was told it…….back in the mid 1970's when Burt and company started designing the Quickie they were looking for suitable airfoils for this unusual little airplane. They were looking for an airfoil for the canard that would perform well at slow speeds. Airfoil data was available, but mostly limited to NACA data and none that would be of any value for such a small airfoil.

They came across hard data for the University of Glasgow GU25 airfoil and it met their needs for the Quickie canard. The GU25 had previously been used on very slow airplanes like human powered aircraft and hang gliders. It seemed like an airfoil that would work for the Quickie. All was well with the Quickie until a test flight encountered some light rain and the airplane was almost crashed due to unexpected loss of lift due of contamination (water droplets) on the canard.

The Quickie was a neat little airplane, but people wanted bigger and faster…..enter the Dragonfly (and Q2). It was only natural for the designers of these follow-on airplanes to simply up-scale the size and the airfoils were included in the up-scaling. The GU25 was used on for the canard and the Eppler 1212 was used for the wing.

If it is your goal to make buckets of lift at a low airspeed and don't want the complexity/weight/drag of flaps, the GU-25 airfoil may be a good choice. If made correctly and maintained clean and dry it is laminar attached to 45% chord, turbulent attached to an impossible 95% chord and makes its lift at relatively low angle of attack. It is by all accounts a "super-lifter". It is little wonder that it was chosen to be the human powered flight airfoil on the Gossamer Condor.

However, in the real world you have other considerations to keep in mind. There is dew, rain, bugs, dirt and imperfect fabrication. How does this affect a "super lifter" airfoil? Historically the GU25 has not faired so well. There is not much documentation on the effects of building the shape wrong, but aerodynamically the effects are fairly predictable. If you flatten out the "hump" (the most common mistake), the foil will make less overall lift and you will have to deploy the elevator farther to achieve slow flight.

This flattened out shape will be less prone to the adverse affects of leading edge contamination and will make less drag. The differences would be slight but measurable. If you make the "hump" higher, the airfoil will make more lift than ex-

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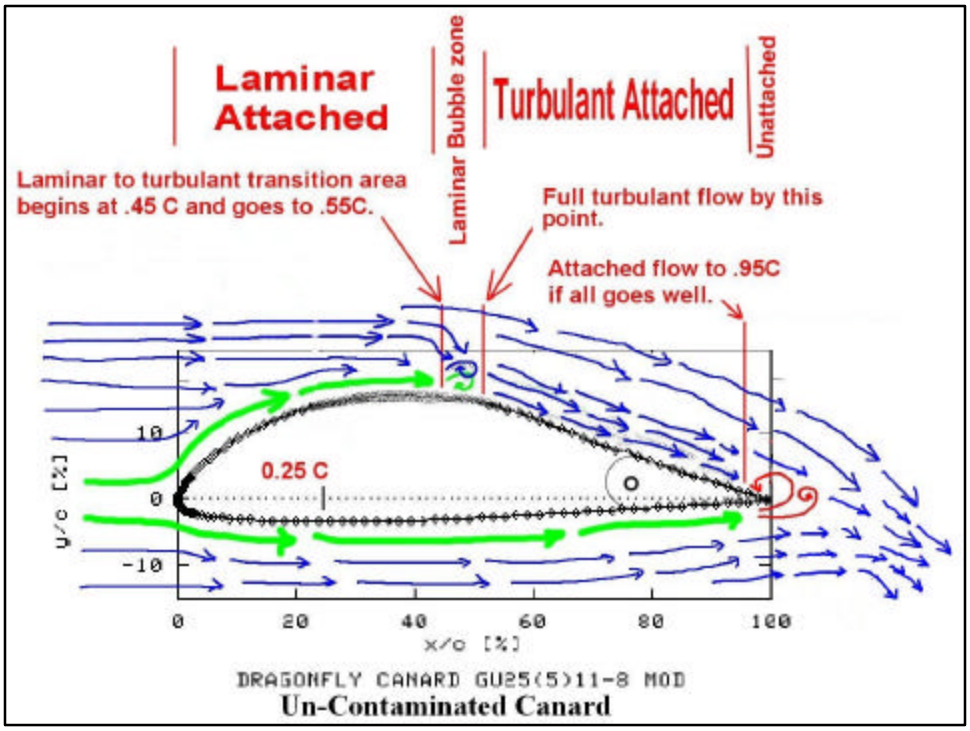
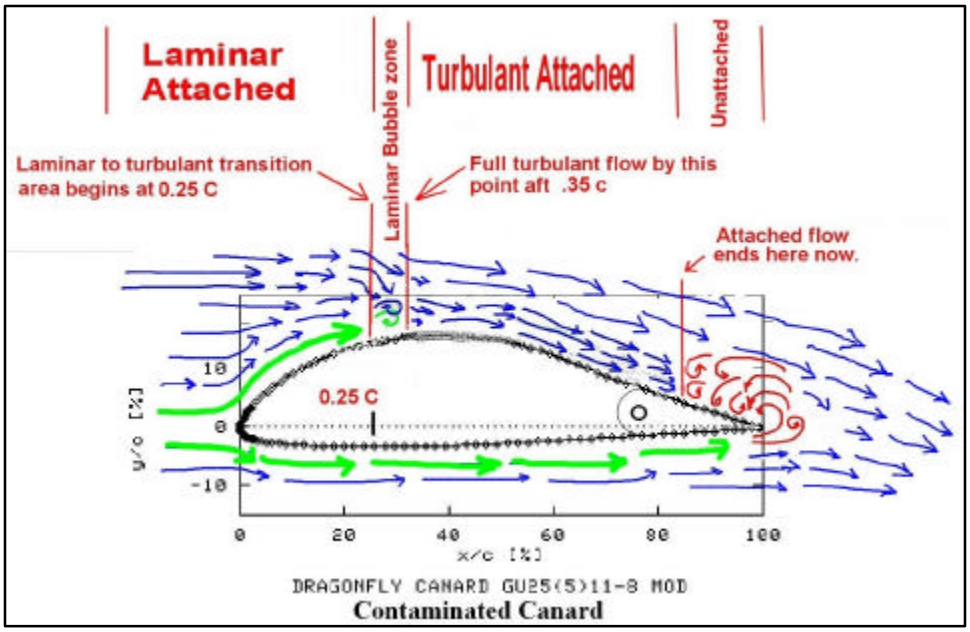
pected and the elevator will be needed less to fly slowly. In a higher hump version of the foil, the drag and instability induced by any leading edge imperfections will increase greatly. In either case, you have a completely new airfoil that there is no wind tunnel or computer modeling of. It would be totally experimental.

In general, the effects of the real world on the GU25 foil are not positive. Water, bugs and dirt are part of the real world flying experience so we will look at these factors and how they affect the lift and drag created by the foil.





Paint lines, water droplets and leading edge bugs all do about the same thing to the GU25 airfoil. They cause the flow of air just above the wing's surface to switch from "laminar" to "turbulent" before it is supposed to. A discussion on laminar vs turbulent flow is beyond this discussion, but in general terms laminar flow is about half as "draggy" as turbulent flow. So for every inch of chord we can keep the airflow over the surface laminar and attached, we only pay half the drag that would be required for a turbulent attached flow. With that in mind, it is a good time to mention that most any airfoil has laminar flow across its upper and lower surfaces from the leading edge to about the 25% chord location. Pretty much no matter the shape, how dirty, wet or buggy the leading edge gets, the airflow over it stays attached and laminar for at least the first ¼ of the chord length. Remember that the longer the flow stays attached and laminar, the lower the overall drag and the more total lift of the surface.

The airfoils of yesterday were "turbulent flow" from the ¼ chord location on to the separation point. The designers never considered any extra lift that they might get from extending the laminar flow range so the loss of this "wishful thinking" lift is never an issue. The amount of wing you need to carry when using a turbulent flow foil is based on worst-case lift conditions. As there is little difference between the best case and the worst case with these older airfoils, there are few surprises. They work about the same dirty, buggy or banged up. The aft wing of the Dragonfly is a turbulent flow airfoil. The designer only expects it to carry laminar attached flow to the ¼ chord point and then have turbulent (attached) airflow the rest of the way. The Dragonfly carries a little extra aft wing than it would theoretically need as a result of this airfoil design choice.

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Today's aerodynamically engineered laminar airfoils can routinely maintain their laminar flow regions to 30%, 40% or even 50% of the chord length. This allows them to make considerably more lift from the same area than their older turbulent kin. It also requires them to be kept physically clean, dry and undamaged (think gliders and how polished they are kept). If you allow a laminar flow airfoil to get dirty, wet or buggy, they go back to their roots and become a turbulent flow airfoil that only has laminar flow for the first ¼ chord. This is known as tripping the boundary layer prematurely and causes the foil to make considerably less lift and more drag. The Dragonfly's canard is one of the most radically engineered laminar flow airfoils ever created.

The GU25 (the Canard on the Dragonfly) was designed to be laminar to at least 45% and under ideal conditions to 55% of the chord length. What this means to the builder is that you can carry the minimum wing area and still fly. It also means that you are counting on that foil to stay laminar to get all that awesome lift. If bugs, water, or degradation mess up the laminar to turbulent transition region (like tripping it early), the flow reverts turbulent and the lift created is substantially decreased. The area affected by this loss of lift can be as much as 20% to 30% of the chord length (times the whole span). Turbulent airflow is still attached airflow so you are still making lift, but the lift you are making is not nearly as much. Let's say turbulent flow is 50% less effective at making lift than laminar flow.

An example: a clean, dry, happy canard is flying along in laminar flow bliss. It is making 100% of its designed lift because it is slicing thru the air with 40% of its surface in perfect laminar flow. Now it is attacked by gnats…..lots of gnats…..sticky little buggers that make a mess of the leading edge. The boundary layer trips from laminar to turbulent due to the irregular surface. Now the canard only has laminar flow for the first 25% of the chord. At least 20% of the chord (and that works out to be 20% of the total canard surface area) has switched from laminar flow to turbulent flow. Remember that turbulent flow lift is only 50% as efficient as laminar flow lift. So that means that 20% of the surface area of the canard is now making half the lift it was a few gnats ago.

The math looks like: Total Lift Loss = 0.20 * 0.50 * 100 (percent) = 0.10 (or 10%)

So now that the leading edge has a few bugs on it the entire canard is now making 10% less lift. If you are counting on that lift to keep your nose up, you are in for a rude surprise. But no doubt some astute reader is thinking, "hey, that rear wing got slammed by them gnats too….that means it also lost 10% of its lift and the Dragonfly as a whole will just start to sink a little". Good thought, but wrong. The aft wing is a turbulent flow airfoil. It is only a mediocre lifting machine at best. Having some bugs on its leading edge has little affect on its performance so the aft wing keeps on keeping on.

You might ask why is this loss of lift due to contamination problem just being addressed now if it has been known for 25+ years. The loss of lift was talked about in Dragonfly Newsletter #3 in the summer of 1981. The two paragraph article talks about flight testing and said "Recent test data confirms the earlier data indicating the critical nature of the smoothness on the wing and canard, but especially on the canard. What would be a normal load of bugs on the leading edge of most aircraft will effect the performance of the Dragonfly to a noticeable extent. This is because the smooth canard will support extensive laminar airflow while the addition of bugs (or a rough finish) will destroy much of that laminar flow. The answer it to produce as good a surface as possible and keep it clean. Bugs are much easier to remove just after landing. Keep in mind that the minimum flight speed will be higher with bugs than without. The same is true for rain drops."

Between the Summer of 1981 (Dragonfly Newsletter #3) and the Summer of 1986 (Dragonflyer #22) loss of canard lift due to contamination was addressed in 8 newsletters. The prototype noted a decrease in cruise speed of about 15 MPH IAS, an increase in the minimum flying speed by about 10 MPH IAS, and the take-off distance could be doubled when the canard was contaminated. So we know there is a problem with the GU25 when it gets wet or dirty.

Dragonfly Newsletter #16 published in the Fall of 1984 commented about pitch trim change when you fly into rain. Dragonfly flyers reported different reactions ranging from minimal pitch trim change to severe pitch trim change that "scares the Hell out of them". The article went on to say that the original prototype with the MK-I canard had a more pronounced pitch trim change than the prototype with the MK-II canard, both used the same airfoil. Also addressed was the pitch trim change with respect to the aircraft center of gravity. It was noted that the airplane flown in the aft end of

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the center of gravity envelop noticed a moderate, predictable, and manageable pitch trim change. As the center of gravity goes further forward the pitch trim change becomes progressively more of a problem.

Dragonfly Newsletter #16 published in the Spring of 1985 had some interesting comments. Jerry and Art Wilson built a Dragonfly with a MK-I canard and the canard was broken at 35 hours due to an off-runway excursion. They built another canard and put the landing gear out on about a 10' centerline in wheel pants similar to the what was originally used on the MK-I. An engine problem forced them to land the airplane in a dry riverbed which resulted in another broken canard. Then they built a third canard, the same as the second except the gear was put on about a 8' centerline. The airplane produced different effects in the rain with each canard. The first canard experienced a 10 MPH increase in stall speed and a pronounced pitch down in the rain. The airplane stayed controllable, but it was a big nuisance. The second canard built by the same two guys using the same set of templates showed virtually no change when bugged up or flown in the rain. The third canard, still built by the same two guys using the same set of templates, experienced a reaction somewhere between the first and second canard.

What can we do to eliminate or reduce this problem? You probably all remember the old saying that an ounce of prevention is worth a pound of cure—right? It is needless to say that we want to get the most perfect airfoil shape that we can, but the work of the Wilson brothers indicate this may not be as easy as just trying hard. The first possible suggestion came in Dragonfly Newsletter #16 when they talked about the sailplane pilots using 400-600 grit sandpaper to create a slightly rough surface by chord wise sanding the front 40% or so of the top of the canard. As I understand it, the reason for this is to prevent rain drops from beading up like it does on your nicely waxed canard. A few Dragonfly owners have tried this and found it to be somewhat useful reducing the pitch trim change when flying in light rain, but does not do anything to help in heavy rain or if the canard is contaminated with bugs or anything else.

Something that has proved very successful in completely eliminating the loss of lift/pitch trim change is the installation of vortex generators (VG's) on the canard. Before I go any farther though I must warn you that it is absolutely critical that the canard stall before the wing. If the wing were to stall before the canard, a deep stall, that would be a VERY bad thing. We are not trying to reduce the stall speed of the canard, we are trying to re-attach the turbulent separated airflow to the airfoil. VG's do just this task. In part 2 of this article I will detail how to make and install your own VG's using very inexpensive materials you can buy at your local hardware store.

An in-depth analysis of the aerodynamic properties was conducted and presented to the AIAA in the Journal of Aircraft, Volume 25 / No. 8 on page 702 / August 1988 paper 6-2229 at the AIAA Atmospheric Flight Mechanics Conference, Williamsburg, VA August 18-20 1986. Some stuff that may be of interest to the home builder has been sketched onto the graphics on page 10.

Editor Ramblings

I hope this newsletter finds you and your family happy and healthy. The holiday season is right around the corner and Jill and I would like to wish you a Merry Christmas and Happy New Year. I am building experience and confidence in my Dragonfly MK-IIH. As of this writing I have about 23 hours on all my modifications and most everything is working great. I weighed the plane recently and was not really surprised by anything. My airplane weighs 797 pounds and has an empty center of gravity of 57.13".

I have determined the actual moment arm of my fuel tanks by adding fuel two gallons at a time and reweighed the airplane. My main fuel tank is located at 60.10" and my header tank is located at 47.00". I also established the moment arm for the pilot and co-pilot station. Both pilot seats are located at 76.60".

797 pounds sounds heavy for a Dragonfly with a VW engine, but most of the extra weight is easy to locate. When first built as a MK-I (I think—the logbook did not specify this, but it makes sense by reading the entries) the plane weighed 737 pounds. The builder built in a lot of nice features in the plane…..but most added weight. The airplane has provi-

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sions for the standard MK-II inboard gear, but is configured as a MK-IIH. The builder mounted the rudder pedals on a removable shelf attached to the fuselage. Cleveland 5" wheels add a little weight and so does the dual brake pedal set-up. My dual side stick control system probably adds a few pounds…...pretty soon all those ounces add up to real pounds, but the airplane performs well with the 80 HP Limbach and it can truly be flown equally well from either seat. In fact, I have flown about 1/2 the time from the left seat.

I have decided to try something a little different for the newsletter in 2005. If you would like to receive the electronic version only of DBFN I would like to pass the postage and printing saving on to you. The rate for the electronic version will be $15 per year. If you have already sent in your subscription renewal I will be happy to refund you the difference or apply it to your 2006 subscription.

The newsletter was a little longer this time…..hope you don't mind. Tim's article in DBFN 110 consumed quite a bit of space and kind of stretched my goal to provide technically oriented articles, but I received more feedback about Tim's article than any other article so far this year…..and they were all positive comments. It is motivating to hear about flights like Tim's. If you are currently building your plane I hope it inspires you to go out and work a little harder.

I am always looking for articles to publish in YOUR newsletter. You might be surprised how interested other builders are in your project. I hope to get DBFN 112 out to you before Christmas.

Jeff

Classifieds

For Sale: 2 Dragonfly Projects. 1st unit (pictured) is 80% completed Task Research fuselage, All controls installed w/latest mods to include tail- wheel steering mod (DBFN 107), hydraulic toe brakes, servo tabs on elevator & ailerons and electric trims on both, electric reflexor unit, interior package in (light tan leather & cloth), fuel tanks installed, Lycoming 0-235 C2A W/ 1157hr. since NEW. Jeff Rose dual electric ignitions, light weight starter, Air Wolf remote oil filter/cooler system, Terra Digital 760 Com and 200 Nav W/G.S, Terra 840 Intercom w/3 light MB, Terra electronic CDI unit with GPS or Loran input display and auto pilot output, Morrow 618 (round) full data base loran, Narco AT 150A Xponder w/encorder, Whelen tail/nav/strobe kit, 6ea Ray Allen electric servos, PC700 vertical card compass, and 25 year collection of engine instruments, wheels and brake units, etc.

2nd project is a standard Dragonfly built from plans. Fuselage sides & belly pan and bulkheads done, wing completed, and all foam for rest of plane is cut ready to glass, all glass to finish and carbon fiber included , nearly complete Ken Brock metal control kits, Fiberglass hoop gear, wheel and tires, brakes, + more,

Take all for $16,000 or best offer. Philip Tinlin, 17 Andrews DR, Daleville AL 36322, E-Mail pc.tinl@juno.com Phone: (334) 598-2287 or (334) 379-9410

For Sale: Dragonfly Xpresso. Fast Subaru 150 HP turbo charged engine taking Xpresso up to 200 mph. Only burns 7 gallons per hour. New radio, transponder, and vortex generators. $25,000 or best offer. (I want to get a 4 seater). Call Thomas Cheatham in Basalt, Colorado at (970) 927-0227 or (970) 404-1678.

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For Sale: 1836cc engine complete from prop spinner to firewall for a Dragonfly. All new engine with four hours run time. Dual ignition (one slick magneto and one electronic). Exhaust system complete with heat muff and carburetor heat box, Hapi ultra carburetor, Spin on oil filter, hydraulic lifters. The engine cowling also goes with this, so you will have a complete firewall forward for a Dragonfly. A/P built, $3500.00 Call Joe Anthony at (636) 828-8015 or email hjoe@acer-access.com for pictures or additional information.

For Sale: Continental PE-90 engine (a rebuilt GPU engine) 0-315. This engine has been started to be converted to aircraft use, dual plugs, oil tank and intake started but not finished welding. One magneto, all continental accessories will fit this engine. $1500.00 Call Joe Anthony at (636) 828-8015 or email hjoe@acer-access.com for pictures or additional information.

For Sale: NACA Flush Inlets designed for 1/2" sandwich structures. These make a good looking functional inlet to replace the hand carved per plans ones. Inlets are $40 per pair, plus $4.00 shipping. Note: Spinners no longer available. Contact Charlie Johnson, 2228 East 7875 South, Ogden UT 84405 (801)-479-7446 or e-mail: OneSky-Dog@aol.com

Wanted: Longtime Dragonfly builder Bob Boydston from Sedona, AZ needs some SureFire II dual electronic ignition parts built by HAPI several years ago. N12BB was inspected last year, but has not been flown yet due to ignition problems. Bob would like to hear from anyone who has any of these parts they would be willing to sell. Phone (928) 282-6468.

For Sale: Complete Corvair Engine Kit. All of William Wynn's parts, 10/10 crankshaft w/safety shaft and studs, assembly manual, Aero Carb, Heads rebuilt, dual ignition distributor built by William Wynn w/box enclosure and coils/points/resistors/wires/etc, also complete engine mount for the Dragonfly by William Wynn. All Parts cleaned and ready to put together, Assembly tapes I,II,II,etc. Sold Dragonfly, Have $3,500 invested will sell for $3,000 OBO plus S & H. Contact Fish Fischer @ 503-861-7034 or fishhole@pacifier.com

For Sale: HAPI 1835 VW Engine with prop. Dual ignition engine is complete with a brand new Revflow carb, wooden 52x42 prop (EC) & 12” spinner, 20 amp alternator in accessory case, Lycoming bushings, headers, oil cooler & filter, sheet metal baffling, engine was removed from my recently purchased Dragonfly. $3150 OBO, Call 864-590-7499 (cell) or 864-587-7767 (home), GregBruns@charter.net

Subscriber's Information

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