

## **Cozy Aircraft Forum – Oshkosh 2006**

### **Marc Zeitlin**

OK, I've got 1:01 PM on my cell phone here, which is never wrong, so why don't we crank this up. We've got a pretty big crowd here. I'm impressed that all of you are here. Just to make sure that all of you are supposed to be here, this is the Cozy Aircraft forum, I'm Marc Zeitlin, It's July 28<sup>th</sup> and it's one o'clock, and we're in forum tent 2.

A couple of years ago when I did this forum, I got some feedback that I had asked for, and the feedback I got was that I had over-prepared, meaning that I had all these notes and I was, like, looking down and reading my notes and that wasn't all that good. So this year, I swing the pendulum the other way. I've got a bunch of slides, but I don't even know what's on them. And I didn't prepare any notes or anything so I'm just going to wing this, it's going to be about half an hour and then we'll move on to the next part of the show.

So this is the standard presentation. I'm going to tell you what I'm going to tell you, then I'm going to tell you, then I'm going to tell you what I told you. So, I'm going to give you a little introduction of who I am, what's a Cozy, we're going to thank Nat. Nat's sitting over there. (Audience applauds.) And we'll get to clap some more later, 'cause I've actually got a couple of slides. I'll talk about Aircraft Spruce taking over the plans, why you might want to build and/or fly a Cozy. A little bit about the safety record. Nat always had some information about accident and incidents and evaluations of them in the newsletters and that was always extremely helpful in trying to understand what was going on but I want back and I tried to pull out all the information from the FAA records about Cozy accidents and we'll talk a little bit about that and what happened and why.

We'll talk a little bit about the cost, what support is available for builders and flyers, how many there are, about the fact that Brock has closed their doors and other vendors have taken over. A little bit about my building experiences, some techniques, tips and tricks, trip examples, some examples of airports, and then I had some requests for a little discussion about the structure of the aircraft and some common modifications, some that are approved, some that are not approved, some that are not acceptable with an extra parenthesis. A little bit about futures and conclusions, questions and answers, and then I'll introduce Chris Essylstyn.

I decided, actually after I had made up this slide, that if it works ok, I'd just as soon take questions in line while I'm talking, so if somebody's got a question, raise your hand. If it gets out of hand, I'll tell you all to shut up and we'll hold them to the end.

So who am I? Marc Zeitlin. A lot of you know who I am. That's where my biography and resume is if you're really interested in that sort of stuff. I've loved airplanes since I was younger than these kids here. I've built a zillion model aircraft. Now I was not very good at flying them but I was good at building them. So I've only got two left out of the zillions that I've built. My thesis for my master's degree was on the design construction of testing of an electromagnetically launched model glider. This was something that we were working on for the Navy. They wanted to replace catapults on aircraft carriers with essentially a DC rail gun and so they wanted something that we could demonstrate that would get accelerated to 200 miles an hour in a 10-foot length which basically meant that it had to accelerate at 200 Gs to 200 miles an hour and we managed to build something that pretty much worked and I got somebody who actually knew how to fly RC models to fly it after it came off the launcher. So that was pretty cool. I actually got paid as a research assistant to build a model airplane. After I got out of college, I built a Quickie Q2. I never flew that one, although the plane has flown with a subsequent owner. And I built a Cozy Mark IV number 386 which is sitting out on the line in homebuilt camping, 83-mike-zulu. Right now it's sitting at 389.9 hours after a 2-hour familiarization flight with Steve Campbell today. And I started and I administer The Unofficial Cozy Builders' Webpage, and The Cozy Builders Mailing List, which many of you are on.

So what's a Cozy Mark IV? Well, a little bit of history: It's a derivative of Burt Rutan's Long EZ, and it evolved through a three-place to a four-place in the early 1990's. And for those of you who are really unsure of why you're sitting here, it's a canard, meaning the big wing is in the back, the small wing's in the front, the engine's in the back, it's got a pusher prop. A little picture up at the top there. It's a four-place, or it could be considered a 2-plus-2 depending upon how big the people are that you want to stuff in the back. Or it's two people and A TON of luggage. You may have seen some of the pictures on the website of my wife and I flying out to California from the west coast with the back filled up with luggage and bags and things and we might have been able to pour a pint of water in there with it if we had had one. And it's a very efficient, fast long-distance cruiser. That's what it's made for and that's what it does. We came out here from Tehachapi last weekend Saturday and Sunday, two 4½- hour legs non-stop, about 1600

nautical miles. We stopped in Greeley Colorado, 4½ hours to Greeley, 4½ hours to here. If I could stay awake that long, we could do it in one day.

There's an explanation of the aerodynamic of the plane in relation to conventional aircraft that Nat gave at his forum last year. I've got that on line. It's in the website and it's a good read for those of you that want to understand the difference between conventional aircraft that have the engine on the wrong end and the wing on the wrong end, and these airplanes.

So here's Nat and Shirley Puffer standing in front of their airplane. Nat's the designer. He took the Long EZ and modified it, turned it into something that people could sit next to each other in and be more comfortable and more friendly, have a lot more space. At this point he's retired, from both work and from the Cozy world, and is building a Jabiru. Somebody sent me this picture of Nat in his garage working on his plane and, sorry to say, the engine is in the wrong end but he'll have a good time flying it.

I want to talk a little bit about some of the wonderful work that Nat did in developing this plane. One of the issues with canards is they can, if the CG is in the wrong place, get into something called a deep stall, which can lock in and become very dangerous. Nat modified his aircraft with a long tube with a weight in it so he could shift the CG while his was in flight, and did extensive testing to guarantee the safety of the aircraft, to guarantee that he understood where the CG needed to be, and there's very few people that have ever done anything like this for the safety of the aircraft. I'm certainly not aware of any other canards that have gone through this type of testing, and this a testament of Nat's desire to ensure the safety of his builders.

So, as you may know, Nat sold the rights to the plans to Aircraft Spruce. Cozy Aircraft Corp., the plans, sales, are now through Aircraft Spruce and I don't know if they brought any here, but if you're interested, you can check in the Aircraft Spruce booth in building A, and you can certainly order them through them.

So why would you want to build a Cozy Mark IV? Well, the first thing is you want to build something. It doesn't necessarily have to be a Cozy but you better want to build. Don't start building a plane unless you want to build a plane. If all you want to do is fly one, look in Trade-A-Plane, look in the CSA newsletter, wait 'till one comes up for sale. A few come up for sale every year. You'll be able to find one. If you start building and you don't want to build, you're going to end up with a one third finished project that somebody else is going to get a real good deal on.

The Use Model Comparison. What are Cozys good for? They're good for going fast from one place to another. You've got to determine if that's what you want to do. I wanted to be able to get in the airplane, go visit people that are half way across the country and do it in a day. I didn't want to go fly and land on sand bars and go fishing, I didn't want to go bush flying, I didn't want to just buzz around, I don't want to do aerobatics. I wanted to get from one place to another quickly and efficiently. That's what this plane does. It's very economical. We cruised out here, as I said, from Tehachapi, our true airspeed was about 172 to 175 knots and we were burning 9.3 gallons an hour doing that. Slow down a little more than that, you get even better gas mileage, but that pretty darned good.

Carrying capacity. If you're going to carry four people, it's pretty tight. I've taken four people up for rides and it gets a little cramped and you're not going to take any luggage with you. But if you've got two people or even three people, it's not bad. I flew out here with two guys from Tehachapi, not real big guys but still three seats were full, all our camping gear, a tent, three sleeping bags, three bags, two PCs, sleeping bag pads, clothing, video cameras, blah, blah, blah. So, it was an awful lot of stuff you can cram in the back even with three people, AND full fuel, three people, all that stuff and it was stuff about 50 to 100 pounds under gross.

Compare the safety features. There has never been a failure, a structural failure, of a Rutan derivative composite aircraft that was built correctly. Well talk about accidents later but that's a fact. You've got the stall resistant capability of the plane which is something I demo in all the demo rides I've done this week. Pull all the way back on the stick, the plane just bobs along. Crank it over into a 35 or 45 degree bank, and you're bobbing along, turning. You're not going to spin, you're not going to fall out of the sky. And then it's made out of composites. Do you want to build an aircraft out of composites? That's something you've got to determine. Can you deal with the chemicals? Do you want to buck rivets? Do you want to work in wood? Do you want to work with composites, where you really only need scissors and a scale and then you can build an aircraft?

Let's talk a little bit about the safety record. Like I said, there have been no accidents caused by structural or aerodynamic failures of properly built and flown Cozy aircraft and, in fact, of any Rutan derivative canards. That's VariEZEs, Long EZs, 3-place Cozys, 4-place Cozys, none. Since 1989, there have been 11 reported accidents in the United States, and this is from the FAA database. There may be things going on that we don't hear about.

In fact, my incident is not listed here, but these are the reported accidents. There's been one in Mexico, two in France, two in South Africa, and as I've said, there've been a few that have been unreported, but by definition the unreported ones are low severity. If anything, very low severity. If anything severe happens, it gets into the database. There have been four fatal accidents in Cozys. One was caused by a poor approach and a hard landing. One was caused by a low approach snagging wires off the end of the runway, so you can imagine how low that was. And in fact, there were four people in that aircraft, two of them were killed, the two people in the back seat lived. So even there on a very bad crash, it wasn't completely fatal, for the people in the back seat. One was caused by severe wind shear going into a relatively short runway in Mexico, not keeping speed up enough. And one was caused... there's sort of a question mark on this. They're not really sure exactly what the causality was here but we believe there was some improper construction of the wings and a possible c.g. problem that occurred in France. Then there have been 11 non-fatal accidents, and look at the causes of these: fuel exhaustion, GU canard contamination which is also possibly center of gravity related. Another center of gravity related deep stall, that the pilot admitted he had put the c.g. in the wrong place, miscalculated, had the vortilons either off or not in the right place. A lot of issues on that one. There have been four engine/fuel system failures, two poor approaches and landings, one rudder flutter. This is another one in France that was improperly built. I had the same issue on my plane. I got rudder flutter at about 202 miles an hour in some of my first few flights and I had to adjust it. I didn't have any structural failure, but again, that's a mistake in rigging the aircraft.

Yes, question? (What is a GU canard?)

The GU canard is the original canard. It's a different airfoil shape. It was used on the VariEZE, the Long EZ and the original Cozy three-place. GU stands for Glasgow University which is where it was developed, in Scotland.

One possible over-tightened bolt, and these are the last couple of accidents that have occurred recently in South Africa. Over-tightened bolt, wheel pants got tangled in the wheels. It might have just been bad landing technique. We're not really sure exactly what happened there. And then the last one was a poor take-off with no rotation off of a grass runway by somebody who was still in their phase one testing period, and didn't really know how long the runway was that they were taking off of and how far they should go before they should abort the take-off.

So you can see by looking at these, there's nothing here that says "wing fell off", "canard fell off", "landing gear fell off". All these accidents are either people making some sort of mistake, which is what people do, or something like engine/fuel system failure which has nothing to do with what type of airplane it's in.

I'll talk a little bit about cost. On the low end, there are people who are building these things for twenty five thousand, forty thousand bucks. Al Wick claims he built his plane for about twenty to twenty five thousand dollars. You're going to need a high-time engine, maybe a cheap auto conversion. You're going to need to be good at scrounging. You're going to have a minimum instrument panel. VFR only. You're not going to have some fancy Garmin stack in there. Mid range might be 40 to mid 70s. You may be able to get some pre-fab parts, maybe a re-built engine, high-end VFR, low-end IFR. I fit into this category. I've got about 68 to 70 thousand dollars in my plane right now. I've got a low-end IFR panel. I bought a zero-time rebuilt engine that I've actually had to put a couple of grand into to get some work done. But this even includes electric nose gear, a number of pre-fabricated parts, so that's certainly do-able. Then on the high end, of course, there's no top limit. People can go crazy. You can get a bunch of parts pre-fab'ed, you can buy a brand new Lycoming engine for 25 or 30 thousand bucks, you can get the complete latest Garmin stack, or EFIS and end up spending \$50,000 there. You've got to remember, this is from plans. It's not a kit. You're going to buy plans from Aircraft Spruce, you're going to pay 500 bucks, and then you're going to be able to lay out the money as you go, as you feel like it. You can end up with a full airframe for 15 to 20 thousand dollars, and you've got something that looks like an airplane. Everything will be there. Then, of course, the big money comes when you want to do the firewall back and your instrument panel. But you can spend the money as you go. You don't have to lay it out all up front. You can determine what you want to put in the plans and how much you want to spend, and how much you want to wait and start putting stuff in later.

So. Support methods. Nat, I believe, is still taking phone calls, if you've got questions about things in the plan. Nat, you can wave me off if I'm lying. No? Good. So Nat's still taking phone calls if you've got questions about the plans, you've got some issue that you want to talk to him about, give him a yell. You've got the Cozy Newsletter archives, so all the newsletters that Nat published for Cozys are on line. You've got the Cozy mailing list. Now for people that are scribbling stuff down, all this stuff, this whole presentation, will be on line on the website by probably Sunday afternoon after I get home. So you don't have to scribble down all these

long URLs. It'll all be there under Oshkosh presentations. You've got the Cozy mailing list, which has about 585 people on it, about 300 builders, and 60 to 70 people that are flying Cozys, as well as a number of other Long EZ, Berkut, Velocity, etcetera builders. You've got builders' web pages. There are links from the Unofficial Cozy Builders Webpage, there are links from Rick Maddy's web pages. Every web page you go to will have links to other builders' web pages. So you can find zillions and zillions of builders that have put web pages up with tips and tricks and their techniques and what they did and what their status is. You've got the Canard Aviators Mailing List, which is a generalized canard email mailing list. Not just for Cozys but any canard aircraft, and there's probably about 1500 people on that list. There are hundreds of canard flyers on that list. Two, three, four hundred people, maybe more. It's hard to tell. So there's a tremendous wealth of experience and knowledge on the Canard Aviators List for canards in general. There's also still a lot of people that are building Long EZs and VariEZE's as well as Cozys, so they get a lot of support there. I know that always amazes Burt when you tell him people are building Long EZs.. He looks at you like you're crazy 'cause the plane's 30 years old and he's going "why are you building an obsolete aircraft?". But it's still better than anything else out there for what it does. You've got the CSA Newsletter which is a paper newsletter published by Terry Schubert. If you're building a Cozy or flying a Cozy or building any canard, you should be a member of the newsletter. You should get that because it's a paper manifestation of a lot of the discussions that go on the Canard Aviators list, with a lot of other information as well. Terry collects everything and anything he finds that people send him or that may be of interest to canard builders. It's really useful. There's classified ads and stuff in it so it's a good place to look if you wanna buy an aircraft or sell one or sell parts or buy parts.

So, how many Cozys are there? It's a little hard to tell. We've done some studies by trying to pull some numbers out of the FAA database, by looking at how many plans were sold. We believe there's somewhere in the neighborhood of 2000 Rutan derivative canard aircraft flying which includes VariViggen, VariEZE, Long EZ, Defiant, Berkut, E-Racer, you can read the rest. There's probably somewhere in the neighborhood of 200, 250 flying Cozys, and we're taking world wide here, so again you pull the numbers out of the FAA database. Some of them aren't really flying yet, some of them were flying and not flying any more. If it's in the rest of the world, it's really hard to figure out what's going on. There have been over 1450 sets of plans sold. I'm not sure; it might be close to 1500 by now. The plans are still selling at a rate of about 100 a year, which is amazing. You're looking at 15 years of plans sales and they're still cruising along. People are still

buying the plans, people are building these things. They're coming out at a rate of 20 to 25 new Cozy Mark IV first flights per year. There's probably six- to eight-hundred of these that are actually under active construction. So it's a very active community. There's a lot of these airplanes.

So, as a lot of you who are building found out at the beginning of the year, Brock went "bang!" and shut their doors and everybody's SOL on finding metal parts. So there was a big scramble and right now there are two main vendors that have taken over as manufacturers of Cozy parts and that's CG products, got the URL listed there, and Jack Wilhelmson's EZ nose lift. Now I do not know of the top of my head who's making what. You're going to have to go to the websites and check out the parts lists to determine who's got what parts. I believe that CG products is also trying to ensure that they have a supply of VeriEZE and Long EZ metal parts as well. So if you happen to be building a VeriEze or a Long EZ, you should talk to them about when those parts are going to come on line. Some other part vendors have taken up a little bit of the slack here and there, and we've got listings of both approved, what used to be approved, suppliers and not-approved suppliers on the website.

So a little bit about my building experience. People always ask "well, you know, I don't have a three-car garage or a hangar at my house. Where can I build one of these things?". I built a Quickie Q2 on the mezzanine level of a warehouse. I built a Cozy Mark IV, started it in a small basement which was about the size, a little bit smaller than, of a one-car garage. So I built every component of the Cozy in the basement. I built the spar, I built both wings with the winglets on, the fuselage, turtleback, landing gear, canard, everything was built. Couldn't do any of the assembly there but all the main pieces were built. It took about 2 1/2, maybe 3 years. So that's a relatively small space. It might have been 12 by 18. There's a lot of other folks that have similar experiences that built most of the airplane parts in their living room or their dining room or in their basement and cut holes in their dining room floor to get the fuselage out, and those people have angels for wives.

A little bit about techniques and tips and tricks. There's a lot of interesting techniques that have been developed over the years that are slightly different than what's in the plans that sometimes make things a little faster, a little easier, a little higher quality, sometimes a little lighter weight. Some people do some vacuum bagging. For my mind is a little much work for the weight that you save, but it certainly doesn't hurt any thing and it certainly does save some weight. There's low vacuum bagging that can also have some of those advantages and be a little easier. You can use peel ply with plastic



over it and do a lot of squeegeeing which is a technique that I used a lot. Use hairdryers to warm up the epoxy while you're doing your lay-ups to assist in getting the epoxy out of the lay-ups. For finishing, there's something that has become known as the Cory Bird method. I don't know if it's still here but if any of you have not taken a look at his airplane out there behind the homebuilders' registration building, it's called symmetry, it's yellow, it looks like a one-place plane but it's actually a two-place. It's the best looking plane you will ever see in your life no matter how long you live. So if it's still there, you've got to go over and take a look. I assume he used his own method on that plane. It involves doing a lot of very thin squeegee layers of epoxy over the micro to fill pinholes and get a smooth surface. Wayne Hicks has a really good explanation of it on his website. There's also a technique that I didn't use which was to really lather on the micro really thick when you're doing your finishing rather than doing a bunch of thin layers and trying to let that build up. See the FAQ, the frequently asked questions list that's on the webpage and other folks' web pages. As I said, there's a whole stack of tips and tricks out there that people have used, come up with themselves, for doing little things that can save you a lot of time and just improve the plane a little bit.

So I made these slides up when I still lived on the east coast, but you can see the kind of trips that can be made in this plane. This is one from Fitchburg Massachusetts to Clearwater down in Florida on a trip down to Sun'n'Fun. This is as easy one-day trip. In this case we made a whole bunch of stops because we were visiting people along the way, but this is an easy flight with one stop, say, in Suffolk in Virginia. It's possible if you throttle back and run maybe 8 gallons an hour, you can do it all non-stop. That's a little longer than I want to sit in a plane but it's doable and I know people that have done it.

This was the flight to California when I was moving from Massachusetts to California to start working out as scaled. Started in Fitchburg, flew out to Syracuse to drop my son off at college, flew back to Massachusetts to drop my wife off at a friend's house, flew down to New Jersey to visit my parents, out to St. Louis to visit Kurt Smith, out to Greeley Colorado to visit Lee Devlin, and then picked up my wife and flew out there commercially and flew down through Phoenix and then out to Mohave. Now this was about 5 to 6 days because I was visiting people along the way but you could do this in 2 or 3 days if you wanted to easily. Probably, if you were insane, you could do it in one.

As of now, this is the largest airport I've flown into which is Las Vegas McCarran International. Strangely enough, even through it's a class B, it's very friendly to general aviation. I have no problem parking up at the North West corner at Atlantic Aviation, the controllers are really friendly, and it's kind of cool following a 737 or a 757 in to land.

This is, up until 2 weeks ago, the smallest airport I had landed on, which is Jaffrey New Hampshire. It's 2900 feet. You can't tell from this view but it's uphill and it's made out of the same stuff that Romans made their cobblestone roads out of.

A couple of weeks ago, I landed at Palo Alto airport which is 2443 feet, and had no trouble getting in and stopping in less than two thirds of the runway, and when we took off it was just me and my wife and about half fuel, so we weren't near gross, but we were off the ground in 1300 feet. So there's a very wide range of airports, and people think you need longer runways in these planes, and you do. It's not an RV. You're not going to get off the ground in 500 feet. And at higher density altitudes, you have to be very cognizant of the runway length. There have been some take-offs at Durango at 10,000 foot density altitude where I chewed up five to six thousand feet of the runway at gross weight. So you've got to think about it, but depending on the situation, you can easily get into some pretty small strips.

I was asked to talk a little bit about aircraft structure. There are a lot of people that are contemplating a lot of changes to these airplanes. The fact that there have not been any structural failures of this type of aircraft is not a license to go willy-nilly and make structural modifications, hoping that whatever the unknown safety factor is - and we don't know exactly what the safety factor is because one of these planes have ever been tested to destruction - that that will save your ass because it won't. If you don't know what the safety factor is, you can't assume that it's something big enough to go changing things. The only known testing of a structural part on these types of aircrafts has been on a VariEZE canard, Now granted, it failed at 14 Gs, but we're not building VariEZE's, and that doesn't tell you anything about the wings or the fuselage or the main spar. No Cozy structural testing has ever been done, or if it has been done, no one has ever published it. So, all I'm saying is keep that in mind and be careful. There are modifications that people can do that are safe, but you've got to have some understanding of structures in order to do them.

So what's the purpose of all these things that you hear about when you're building these planes? "Well, we're building the spars, we're building the

shear webs, we're putting in wing skins." What are these things? What do they do?

The spars are the top and bottom thick strips of unidirectional fiberglass that you put in the canard and the wings and the main spar. They carry the bending loads. So when there's lift pushing up on the wing, the spars are the things keeping the wing from doing this: (hand motion showing bending). The shear web is a web of fiberglass that's laid up at an angle underneath the spar caps, wraps around the front of the spar or the back of the spar, depending on which one we're talking about. It transfers load from the top of the spar cap to the bottom of the spar cap. Those two things have to be able to talk to each other as they're getting loaded so that they can transfer the load from one to the other. That's what the shear webs do.

The wing skins, either the canard or wings skins, or actually the fuselage skins as well, they carry twisting loads. So as the wings get loaded and they want to either twist forward or back, the wings skins keep that from happening. It's like a tube. If you take a tube and you try and twist it, it doesn't want to twist. If you cut a slot all the way down the side of the tube and now you try and twist it, it's going to twist really easily. So it's really important that your two trailing edges are actually touching each other in the back, that they're connected. That's what the skins do.

Fuselage. You've got the bulkheads. They stiffen the fuselage in sideways bending and in twisting. The sides of the fuselage do the same thing. They keep the aircraft from bending forward and back in pitching. They help keep it from twisting side to side. You can get differential loading on the wings and on the canard, where the canard's trying to push one way... When you're turning, you've got ailerons that are making the airplane turn one way. The elevators aren't doing that in the front so you get a little bit of a twisting load as you get differential loading on the wings and the canard.

Longerons help stiffen the plane. They also act as hard points for mounting. There's all sorts of things that get mounted to the airplane. You need hard points. You can't just bolt into foam.

And there's a lot of reinforcements. Metal, wood, fiberglass layers that are usually used as attach points for bolting things to that need point loads. Your seat belts, your canard attach points. They transfer loads between the major structures of the airplane.

Some common modifications. There are some major modifications that people make. They remove the lower winglets. Now this is extremely not recommended on a Cozy. The plans and the pilot operating handbook make them mandatory to have for safety margin reasons. It ensures that you have rear c.g. range and deep stall resistance on the plane. You can raise the canopy a little bit. On my plane, I raised it about an inch and a half just to give you a little bit more headroom. That is an approved modification. You can widen the canopy a little bit just to get a little bit more room on the shoulders. Depending on your body size and shape, you may find that your shoulders can be touching the inside of the canopy when it's closed. You can move those out a little bit to give yourself a little more space. There's a Long EZ –type strake modification which has become known as the Cozy Girrrl modification. If you take a look out there on the Cozys, the strakes just go straight forward into the fuselage. On the Long EZs, they kick forward, about 8 inches out and give you a little bit more room up in the sides of the fuselage. Again, that's a personal preference thing. Smaller people may or may not need to have any room there, and I've known a number of larger people that say that it's fine the way it is. But that's another modification that's becoming more common.

Some people have left the canard the original length. That is also not recommended. Nat made it mandatory, if you had built an original length canard, to cut 6 inches off of there. There are some possible safety issues with rear c.g. because of the longer canard your rear c.g. is moved forward. But there are some aircraft with the long canard flying and seem to be doing so safely. It might be useful to talk to those people and understand what they use for a c.g. range if you're contemplating that sort of thing because, as I said, it is not recommended to do that.

Retractable main gear, also not recommended, but there are a couple flying. Chris has got retracts in his airplane that he's going to talk about later. And there are a couple flying with another vendor's retract system.

And there are some engine alternatives which are also not recommended, but again there are a few flying. There are a few Subaru-powered Cozys flying, there are a few Mazda rotary-powered Cozys flying, and more are coming on line all the time. So hopefully we'll get a bit more experience with them and down the road see if that turns into a viable alternative.

Then there are a bunch of minor mods. Electric nose gear, electric landing brake, move the landing lights from a little flip-down door to the nose or out to the strakes or the wing tips. Hanging rudder pedals like the Velocity

instead of having them pivot on the floor. Eliminate the fuselage access door, change the way the canopy latches, have a forward hinging canopy, etcetera, etcetera. There's millions of minor modifications. And again, checking people's web pages is the easiest way to see a wide range of those.

So what's the future of the Cozy? Well, as I said, amazingly enough, it's still going very strong. After all this time, plans are still selling at the rate of about 100 a year. There are new completions all the time, the builder community, the flying community is very healthy and doing very well. There's a slow evolution of some derivatives that's beginning, as you'll see with Chris' presentation. It's a great plane. The canard community as a whole and the Cozy community is just great. The people are wonderful; everybody's extremely helpful and pleasant. You go to cookouts, you go to barbeques and everybody's just terrific. And along with all that, you get an airplane that just has tremendous capabilities. So you've got to think about whether this is what you want. Is this the kind of aircraft that's going to give you the kind of flying that you want to do?