

A white high-wing aircraft is shown in flight, banking to the left. The aircraft has a distinctive shape with a high wing and a tail section. The background is a vast, green landscape with patches of brown and blue, suggesting a rural or agricultural area. The aircraft's registration number, N44CZ, is visible on the tail.

# **COZY AIRCRAFT FORUM**

**Soup to Nuts?**

**Marc J. Zeitlin**

**July 27, 2007**

**1:15 PM – 1:45 PM**

**Forum Tent 02 – GAMA Pavilion**

# What Will I Talk About?



- *Introduction*
- *Who Am I?*
- *What's a COZY MKIV?*
- *Thanks Nat!*
- *Aircraft Spruce – Plans*
- *Why a COZY MKIV (canard)*
- *Safety Record*
- *Cost*
- *Support*
- *How Many COZY's Under Construction / Flying?*
- *Brock Replacement Parts Vendors*
- *My Building Experience(s)*
- *Techniques/Tips/Tricks*
- *Trip Examples*
- *Airport Examples*
- *By Request:*
  - *Structure of Aircraft*
  - *Common Modifications*
    - *Approved*
    - *Not Approved*
    - *Not Acceptable*
- *Futures / Conclusions*
- *Questions and Answers*

# Who The Heck Am I?



- Biography / Resume'
  - <http://www.mdzeitlin.com/Marc/bio.html>
- Loved planes since 3 years old - Built zillions of model aircraft
- Thesis - “Design, Construction and Testing of an Electromagnetically Launched Model Glider”
- Built Quickie Q2
- Built COZY MKIV #386, N83MZ – ~500 flying hours
- Started / Administer Unofficial COZY Builders Web Page and COZY Mailing List
- Work for Scaled Composites as Mechanical Engineer – in charge of transitioning SS2/WK2 from prototype to production by “The Spaceship Company”

# What's a COZY MKIV?



- History
  - Derivative of Burt Rutan's Long-EZ
  - Evolved from 3-place to current 4-place in early 1990's
- Type
  - Canard – big wing in back, small wing in front
  - 4 place, or 2+2, or 2 + LOTS of baggage
  - Efficient, fast, long distance cruiser
- Aerodynamics – Nat's 2005 Oshkosh Forum
  - [http://www.cozybuilders.org/Oshkosh\\_Presentations/Nats\\_OSH2005\\_Presentation.pdf](http://www.cozybuilders.org/Oshkosh_Presentations/Nats_OSH2005_Presentation.pdf)

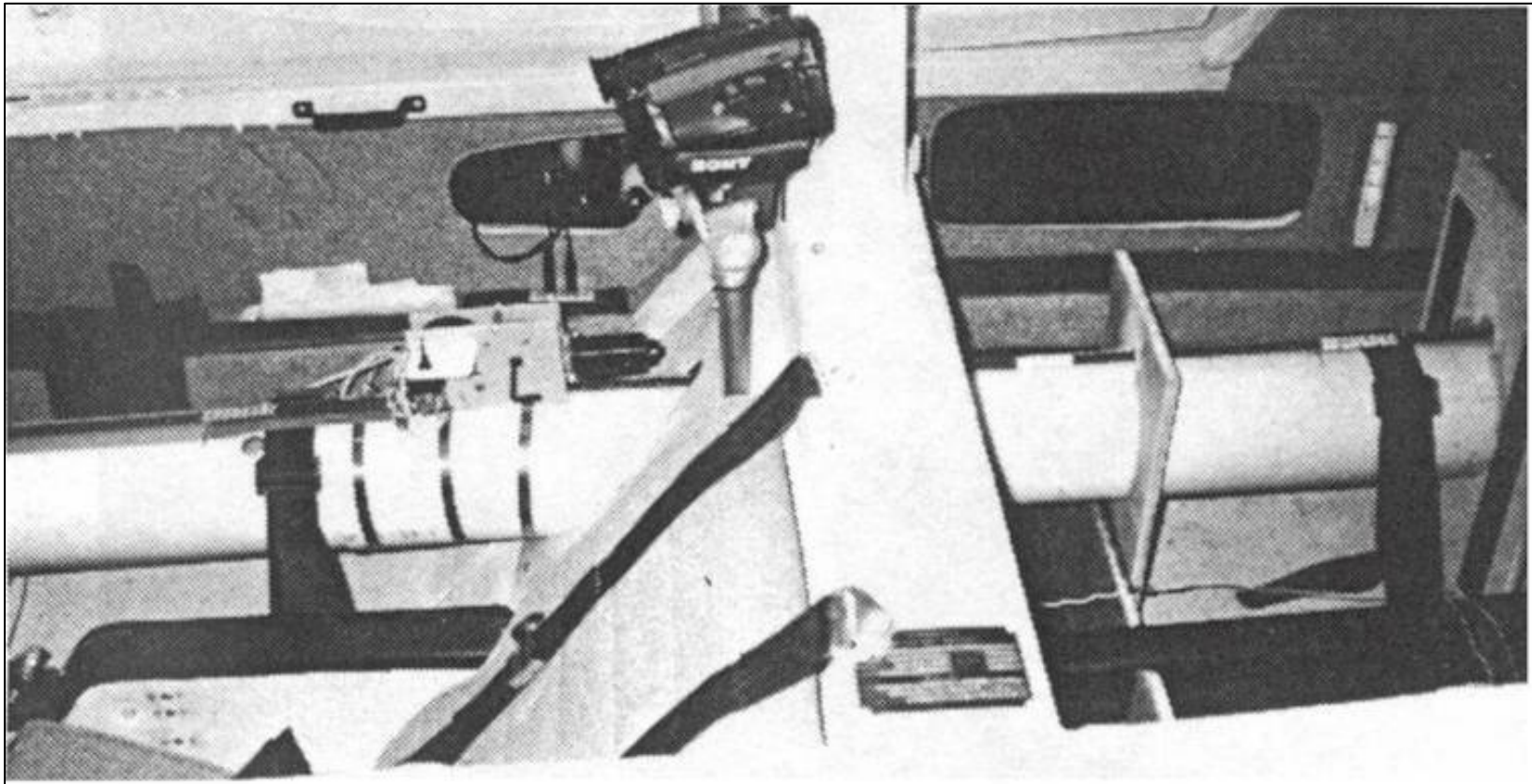
# Nat and Shirley Puffer



- Designer
- Retired
- Building/  
Flying  
Jabiru



# Nat's Rear C.G. Testing Apparatus



# Aircraft Spruce - Plans



- Cozyaircraft Corp.  
now owned by ACS
- Plans available  
through ACS



# Why a COZY MKIV?



- Want to **BUILD**
- Use Model comparison
- Economics
- Carrying Capacity
- Safety Features
- Composites





# COZY Safety Record



- NO accidents caused by structural/aerodynamic failure of properly built and flown COZY aircraft – in fact, of **ANY RUTAN/DERIVATIVE CANARD**
- Since 1989, 11 reported accidents in USA, 1 in Canada, 1 in Mexico, 2 in France, 2 in South Africa (a few unreported, but by definition those are low severity)
- 4 Fatal Accidents
  - 1 poor approach and hard landing - #2
  - 1 low approach snagging wires - #3
  - 1 severe wind shear in Mexico - #8
  - 1 <improper build / CG problems?> in France - #11
- 13 Non-Fatal Accidents
  - 1 fuel exhaustion - #1
  - 1 GU canard contamination / CG related - #4
  - 1 CG related deep stall - #6
  - 4 engine failure / fuel system failure - #5, #7, #9, #13
  - 3 poor approach / landing - #8, #10, #16
  - 1 rudder flutter (improper build) in France - #12
  - 1 overtightened bolts and/or wheel pant tangled in wheel in South Africa- #14
  - 1 poor takeoff / no rotation in South Africa - #15
- Accident RATE – Assume 100 flying (average), 60 hrs/year, average 16 years – 100K hrs total
  - 4/100K hrs fatal – GA is 1.4/100K hrs
  - 16/100K total – GA is 7.2/100K hrs

# COZY MKIV Cost



- Low End - \$25K to \$40K
  - High Time Engine (maybe Auto Conversion)
  - Good Scrounging
  - Minimum Instruments - VFR Only
- Mid-Range - \$40K to \$75K
  - Some Prefab (not much)
  - Rebuilt Engine
  - High end VFR - Low End IFR Panel
- High End - \$75K to \$120K
  - Lots of Prefab components / paid help
  - New Lycoming
  - Complete Latest IFR Stack Panel
- Plans – NOT A KIT!!!

# Support Methods



- Nat Puffer and the COZY Newsletter archives
  - <http://www.cozybuilders.org/newsletters/>
- COZY Mailing List
  - [http://www.cozybuilders.org/mail\\_list/](http://www.cozybuilders.org/mail_list/)
- Unofficial COZY Builders Web Page
  - <http://www.cozybuilders.org/>
- Builder's Web Pages (links from UCBWP)
- Canard Aviator's Mailing List
  - <http://groups.yahoo.com/group/canard-aviators/>
- CSA Newsletter
  - [http://www.cozybuilders.org/ref\\_info/other\\_news.html](http://www.cozybuilders.org/ref_info/other_news.html)

# How Many COZY's?



- ~ 2000 Rutan Derivative Canard Aircraft flying (VariViggen , V.E., L.E., Defiant, Berkut, E-Racer, SQ2000, Velocity, COZY III, COZY MKIV)
- ~ 220 - 300 flying COZY's all over the globe
- ~1600 COZY MKIV plans sold
- ~ 600-800 actually under construction
- 15-20 new COZY MKIV first flights per year

# Brock Replacement Parts



- Brock MFG closed 1/1/2006 – sole MFG of metal parts for COZY / Rutan canards
- Two main vendors took over MFG of parts:
  - CG Products
    - <http://www.cozygirrrl.com/aircraftparts.htm>
  - EZ Nodelift
    - <http://www.eznodelift.com/>
- Other part vendors as well have taken up some slack – see:
  - <http://www.cozybuilders.org/newsletters/suppliers.html>
  - [http://www.cozybuilders.org/newsletters/na\\_suppliers.html](http://www.cozybuilders.org/newsletters/na_suppliers.html)

# My Building Experiences



- Quickie Q2 in a warehouse
- COZY MKIV in a small basement (seen here)
- COZY MKIV in a 2-car garage (most common)
- Other Folks Experiences similar

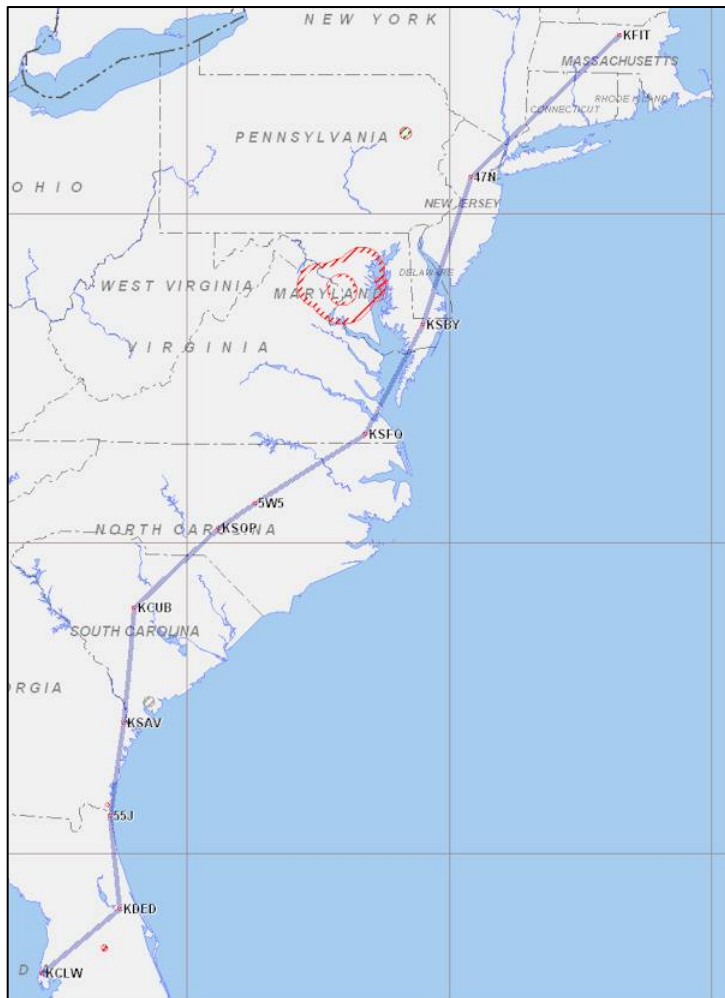


# Techniques, Tips, Tricks



- Layups
  - Vacuum bagging
  - “Low-vac” bagging
  - Peelply/plastic squeegeeing
  - Hair dryers / warmth
- Finishing
  - “Cory Bird” method
  - LOTS of micro: one pass
- See FAQ and folks web pages – LOTS of ideas

# FIT to CLW



Massachusetts to  
Sun & Fun



# Move to California - Visits



August 25<sup>th</sup>, 2005 – September 1<sup>st</sup>, 2005



# Range Of Airports – LAS



# Range Of Airports - AFN



Jaffrey, NH  
2900 ft. x 40 ft.

# Aircraft Structure



- Lack of structural failures in type is **NOT** a license to make structural mods, **HOPING** that the (**UNKNOWN**) safety factor will save your ass!
  - Only known testing to failure is on V.E. canard – failed at 14G
  - At least one L.E. wing test done – no details known
  - NO COZY structural testing has ever been done!!!
- Wing/Canard
  - Spars: Carry bending loads in wings
  - Shear Webs: Carry shear loads in wings – transfer loads from top to bottom
  - Skins: Carry twisting loads in wings
- Fuselage
  - Bulkheads: Stiffen fuselage in bending (sideways) and twisting
  - Sides: Stiffen fuselage in bending and twisting
  - Longerons: Help stiffen – mostly act as mounting “hardpoints”
  - Reinforcements: On LG Bulkheads/Firewall/Seatbelt Attach/Canard Attach - Thicken, hardpoints, transfer loads between major structures

# Common Modifications



- Major:
  - Remove Lower Winglets (mandatory to have on COZY!!!)
  - Raised Canopy (approved)
  - Widened (Aerocanard “style”) Canopy
  - Long-Eze type (“Cozygirrrl”) strake L.E.
  - Original Length Canard (mandatory to cut 6” from original – possible safety issue with rear CG, & rotation, but numerous flying)
  - Retractable Main Gear (not recommended, but there are a few flying)
  - Engine Alternatives; Subaru, Rotary, V8, Etc. (not recommended, but there are a few flying)
- Minor:
  - Electric Nose Gear (approved)
  - Electric Landing Brake (approved)
  - Move Landing Lights
  - Hanging Rudder Pedals (Velocity Style)
  - Eliminate Fuselage Access Door
  - Etc., etc., etc.

# Futures / Conclusions



- Future of COZY
  - Going strong – plans sales ~100/year
  - New completions all the time
  - Slow evolution of derivatives beginning
- Great Plane!
- Great People!
- Great COZY/Canard Community!
- Great Capabilities!
  
- Is This What **YOU** Want?

# Questions? (& Answers)



- My Email: [marc\\_zeitlin@alum.mit.edu](mailto:marc_zeitlin@alum.mit.edu)
- Website: <http://www.cozybuilders.org/>
- For Sale?
- (Training???)
- (Planes out on line for pictures???)
- (Summary of tips/tricks –FAQ / builder’s web sites)
- (Builders Websites)
- (Digital Camera – documentation)
- (Composite Workshops – here/OSH)
- (1st Flights/Testing)
- (Interested folks list – names/email addresses)