SAE Aero Design

Group 10

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Motivation

CELEBRATING 25 YEARS!

SAE AERO DESIGN

- SAE Collegiate Design Series

Project Specifications (Rules)

- **Aircraft Dimension Requirement**
  - Fully configured for takeoff, the free standing aircraft shall have a maximum combined length, width, and height of **225 inches. Aircraft exceeding this design requirement will be disqualified from the competition.**
- **Gross Weight Limit**
  - Regular Class aircraft may not weigh more than fifty five (55) pounds with payload and fuel.
- **Engine Requirements**
  - Regular Class aircraft can still be powered by a single, unmodified O.S 61FX with

Design Concept – 1

- Standard Design

Design Concept – 2

- "Flying Wing"

NASA Dryden Flight Research Center Photo Collection
http://www.dfrc.nasa.gov/gallery/photo/index.html
NASA Photo: ED01-0209-3 Date: July 14, 2001 Photo by: Nick Galante/PMRF
The Helios Prototype flying wing is shown over the Pacific Ocean during its first test flight on solar power from the U.S. Navy's Pacific Missile Range Facility in Hawaii.

Design Concept – 3

- Minimalist Design

Design Concept – 4

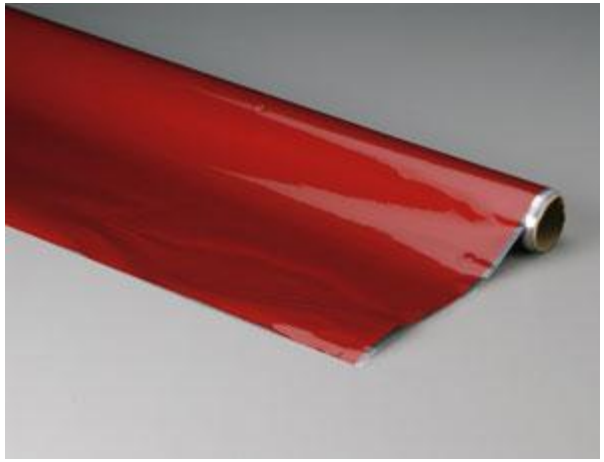
- Double Wing

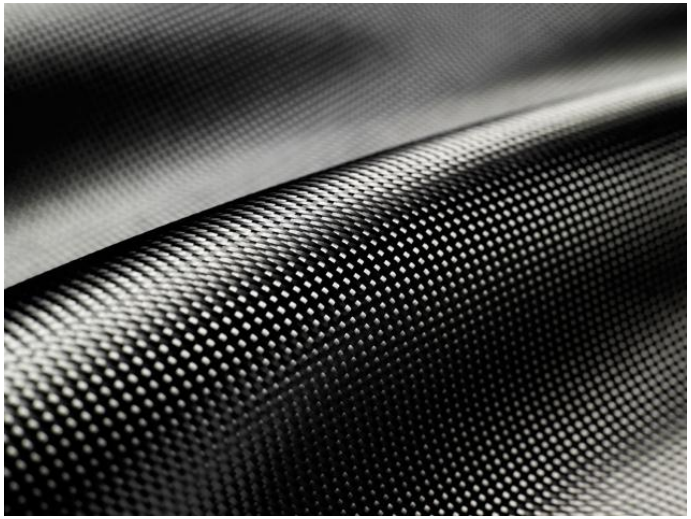
Design Concept – 5

- Biplane

Materials

- Carbon fiber
- Advanced composites
- Balsa wood/heat shrink skin





Decision Matrix

Decision Matrix

Rating: 1 - 10		Concepts									
		Standard Design		"Flying Wing" Design		Minimalist Design		Canard Wing Design		Bi-Plane Design	
Selection Criteria	**Weight**	**Rating**	**Weighed Score**	**Rating**	**Weighed Score**	**Rating**	**Weighed Score**	**Rating**	**Weighed Score**	**Rating**	**Weighed Score**
Potential Lift	20%	7	1.4	9	1.8	8	1.6	8	1.6	7	1.4
Potential Drag	10%	4	0.4	8	0.8	9	0.9	2	0.2	3	0.3
Durability	15%	9	1.35	5	0.75	3	0.45	7	1.05	7	1.05
Cost	10%	5	0.5	5	0.5	8	0.8	3	0.3	4	0.4
Ease of Build	5%	5	0.25	6	0.3	8	0.4	4	0.2	4	0.2
Potential Flight Score	40%	8	3.2	6	2.4	7	2.8	7	2.8	7	2.8
	Total Score	7.1		6.55		6.95		6.15		6.15	
	Rank	1		3		2		4(tied)		4(tied)	

Conclusion and Future Plans

- More analysis to see if our decision matrix results are worthy
- Re-examine design opportunities and finalize on one type of design
- Once one whole design is chosen, examine design possibilities for each component

Slide	Reference(s)
3	http://students.sae.org/competitions/aerodesign/east/
4	http://www.uwindsor.ca/aero/system/files/plane.jpg http://www.airliners.net/aviation-forums/non_aviation/print.main?id=1323590
5	http://www.af.mil/shared/media/photodb/photos/030922-F-0000J-888.jpg
6	http://aerodesign.meil.pw.edu.pl/ad_new/wp-content/uploads/2011/03/IMG_6904na_strone.jpg
7	http://my.fit.edu/cargoplane/img/taxi1%20011.jpg
8	http://www.engin.umich.edu/teamprojects/teams/aero/teamprojects/teams/aero/mfly4.jpg http://iignite.com/SAE/Gallery/content/bin/images/large/_0114022654.jpg
9	http://dsgperformance.files.wordpress.com/2010/03/carbon-fiber-frame-lg.jpg http://www.airfieldmodels.com/gallery_of_models/rc/wermachts_scorpion/images/17581.jpg

ANY QUESTIONS?