Environauts EN-1
2009-2010 AIAA Design

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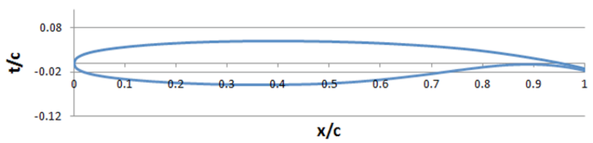
Mission Statement

To develop a commercial aircraft that optimizes the use of alternative fuels through new operations and technologies.

Main Wing Airfoil

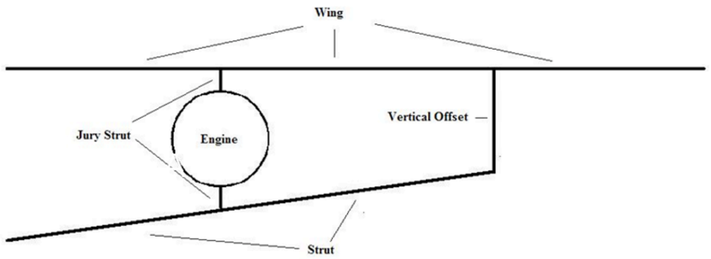
SC(2)-0610



Request for Proposal Compliance

Design Factor	Requirement	EN-1 Capability
Safety and Airworthiness Regulations	FARs	
Crew	2	2
Passengers	175 (1 Class)	180 (1 Class)
Seating	Pitch 32", Width 17.2"	Pitch 32", Width 17.4"
Cabin Dimensions	Width > 12.5 ft	Width = 13.28 ft
	Height > 7.25 ft	Height = 8.335 ft
Cargo Volume	1,240 ft^3	1,240 ft^3
Takeoff Distance	8,200 ft	4,388 ft
Landing Speed	< 140 KCAS	135 KCAS
Maximum Landing Weight	Maximum zero fuel weight plus fuel reserves for maximum range	
Operating Speed	Cruise: Mach 0.8	Cruise: Mach 0.8
	Maximum: Mach 0.83/340 KCAS	Maximum: Mach 0.83
Cruise Altitude	Initial: 35,000 ft	Initial: 35,000 ft
	Maximum: 41,000 ft	Maximum: 41,000 ft
Range	Nominal: 1,200 nm	Nominal: 1,200 nm
	Maximum: 3,500 nm	Maximum: 3,500 nm
Payload Capability	37,000 lb	39,860 lb

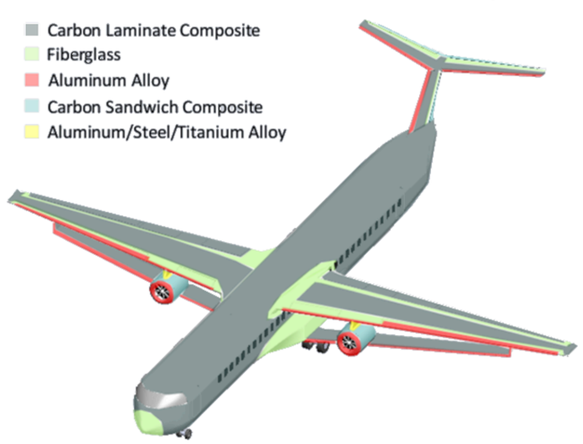
Strut-braced Wing Design



Alternative Fuels Study

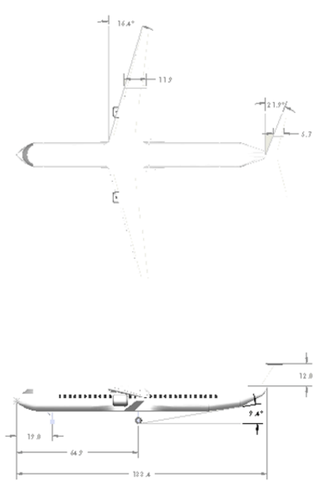
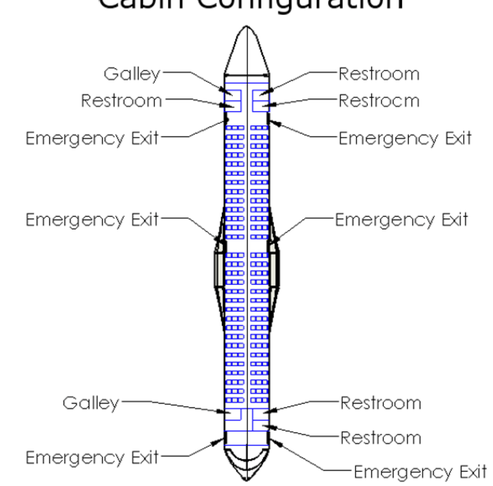
Criteria	Weight (%)	Ethanol		Butanol		Biodiesel		Jatropha/Algae SPK	
		Points	*Weighted*	*Points*	*Weighted*	*Points*	*Weighted*	*Points*	*Weighted*
Drop-In Capability	4	3	0.12	4	0.16	5	0.2	5	0.2
Blend Capability (with Jet A-1)	6	5	0.3	5	0.3	5	0.3	5	0.3
Volume Required Compared to Jet A-1	20	2	0.4	4	0.8	5	1	5	1
Mass Required Compared to Jet A-1	15	2	0.3	4	0.6	4	0.6	6	0.9
Ease of Ignition	5	6	0.3	6	0.3	2	0.1	5	0.25
Cold Weather Capability (Unblended)	9	3	0.27	4	0.36	3	0.27	5	0.45
Cold Weather Capability (Blended)	5	4	0.2	5	0.25	4	0.2	5	0.25
Infrastructure Redesign	7	3	0.21	4	0.28	5	0.35	5	0.35
Ease of Acquiring/Production	6	5	0.3	4	0.24	4	0.24	4	0.24
Overall Environmental Impact	15	6	0.9	7	1.05	6	0.9	8	1.2
Safety Hazards	8	4	0.32	5	0.4	5	0.4	5	0.4
Totals	**100**		**3.62**		**4.74**		**4.56**		**5.54**

Materials used in EN-1 Body



EN-1 Dimensions

	Wing	Vertical Tail	Horizontal Tail
Area, ft^2	1534	116.4	249.8
Aspect Ratio	12.23	1.24	7.75
Taper Ratio	0.249	0.652	0.481
MAC, ft	11.93	9.47	5.68
Dihedral (Deg)	-5	0	0
1/4 Chord Sweep (Deg)	13.5	40.9	19.8
Root Chord, ft	17.05	11.3	7.37
Tip Chord, ft	4.25	7.31	3.53
Span, ft	137	12	44



Cabin Configuration